

1/40d *U113*
12
TM
1943

TM 9-1245

U.S. Dept of Army

WAR DEPARTMENT

TECHNICAL MANUAL



ORDNANCE MAINTENANCE

**37-MM ANTITANK GUNS M3 AND M3A1,
AND CARRIAGES M4 AND M4A1**

6 FEBRUARY 1943

FOR ORDNANCE PERSONNEL ONLY

Donnell
just
none

TECHNICAL MANUAL }
No. 9-1245 }

WAR DEPARTMENT
Washington, 6 February 1943

U113
.2
TM 9:1245
1943
★

ORDNANCE MAINTENANCE

37-MM ANTITANK GUNS M3 AND M3A1, AND CARRIAGES M4 AND M4A1

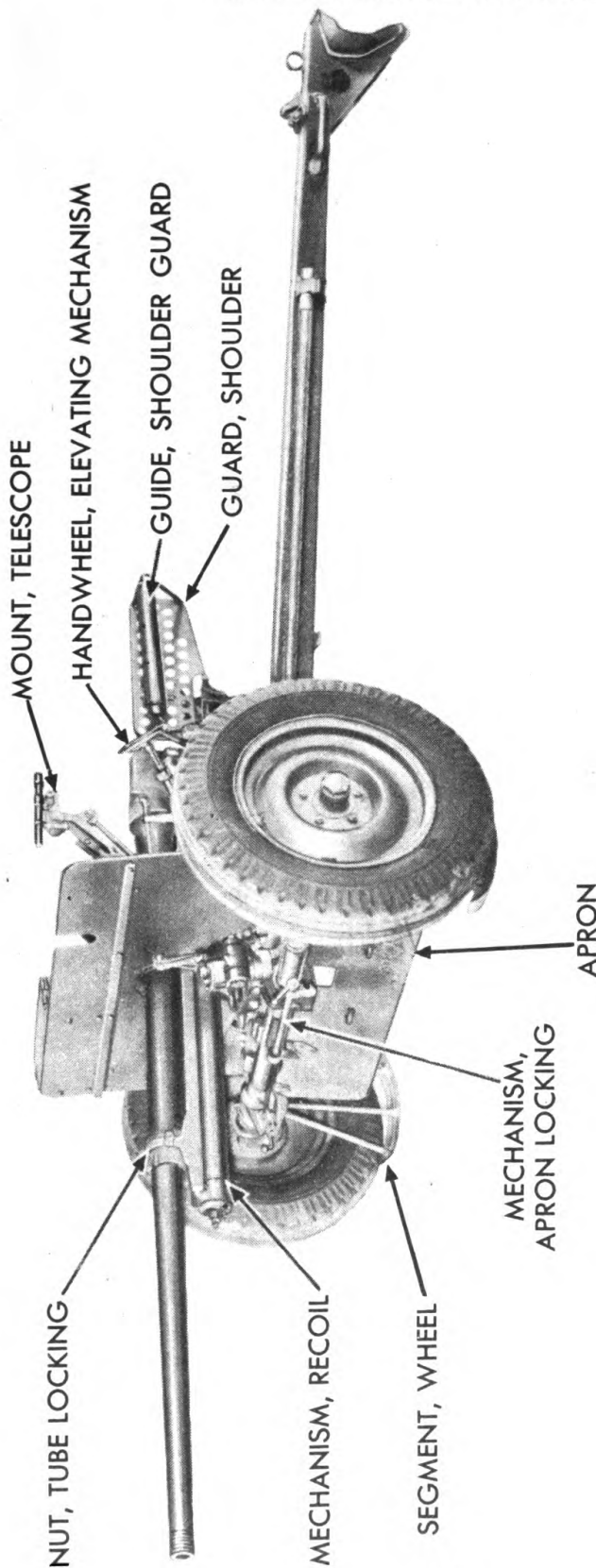
CONTENTS

	Paragraphs	Pages
SECTION		
I. Introduction	1- 4	4- 13
II. Disassembly and assembly	5-23	14-104
III. Inspection instructions	24-28	105-114
IV. Maintenance and repair instructions	29-48	115-127
V. Special maintenance	49-53	128-132
VI. References	54-55	133-134
INDEX		135-138

*This manual supersedes TM 9-1245, dated 15 January 1941 and Changes No. 1, dated 10 September 1942; TB 1245-1, dated 27 July 1942; and TB 1245-2, dated 5 February 1943.

M572610

ORDNANCE MAINTENANCE — 37-MM ANTITANK GUNS M3 AND M3A1
AND CARRIAGES M4 AND M4A1



RA PD 49956

Figure 1 — 37-mm Gun M3A1 and Carriage M4A1 — Firing Position

INTRODUCTION

RA PD 69588

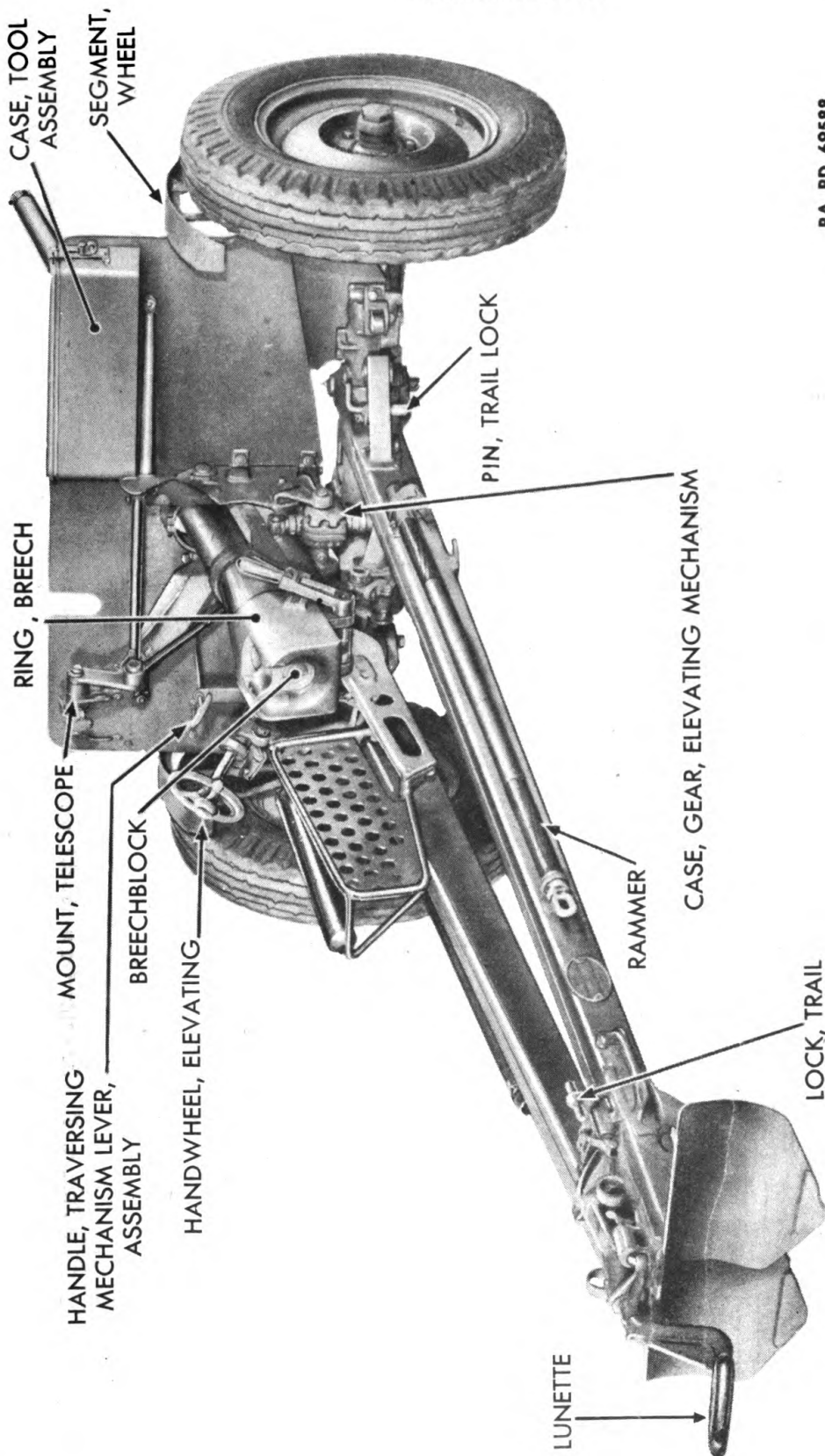


Figure 2 — 37-mm Gun M3A1 and Carriage M4A1 — Traveling Position

ORDNANCE MAINTENANCE — 37-MM ANTITANK GUNS M3 AND M3A1
AND CARRIAGES M4 AND M4A1

Section I

INTRODUCTION

	Paragraph
Scope	1
Characteristics	2
Differences between models	3
Data	4

1. SCOPE.

a. This manual is published for the information and guidance of ordnance maintenance personnel. It contains detailed instructions for the disassembly, assembly, inspection, maintenance, and repair of the 37-mm Antitank Guns M3 and M3A1 and Carriages M4 and M4A1. Additional descriptive matter and illustrations are included to aid in providing a complete working knowledge of the materiel.

b. This manual differs from TM 9-1245, dated 15 January 1941 in the following respects:

- (1) The material has been rearranged and corrected to date.
- (2) Material on the Gun M3A1 and Carriage M4A1 has been included.
- (3) A table of data has been added.
- (4) Instructions for disassembly and assembly have been clarified, enlarged, and corrected to date.
- (5) New and more numerous illustrations have been used to clarify the text.
- (6) Detailed information has been included on such subjects as special maintenance under unusual climatic conditions, lubrication, and storage.
- (7) Inspection and maintenance instructions have been greatly amplified.

2. CHARACTERISTICS (figs. 1, 2, 3, 4, and 5).

a. The 37-mm Antitank Guns M3 and M3A1 are flat trajectory weapons of the field gun type. They are single shot weapons firing projectiles weighing approximately 2 pounds. The breechblock of each is of the vertical sliding type that can be lowered in the breech ring to expose the chamber.

b. The Carriages M4 and M4A1 are the split trail type and are designed to be towed behind a prime mover on roads and cross country. The carriages are designed for one man control of aiming, elevating,

INTRODUCTION

RA PD 69485

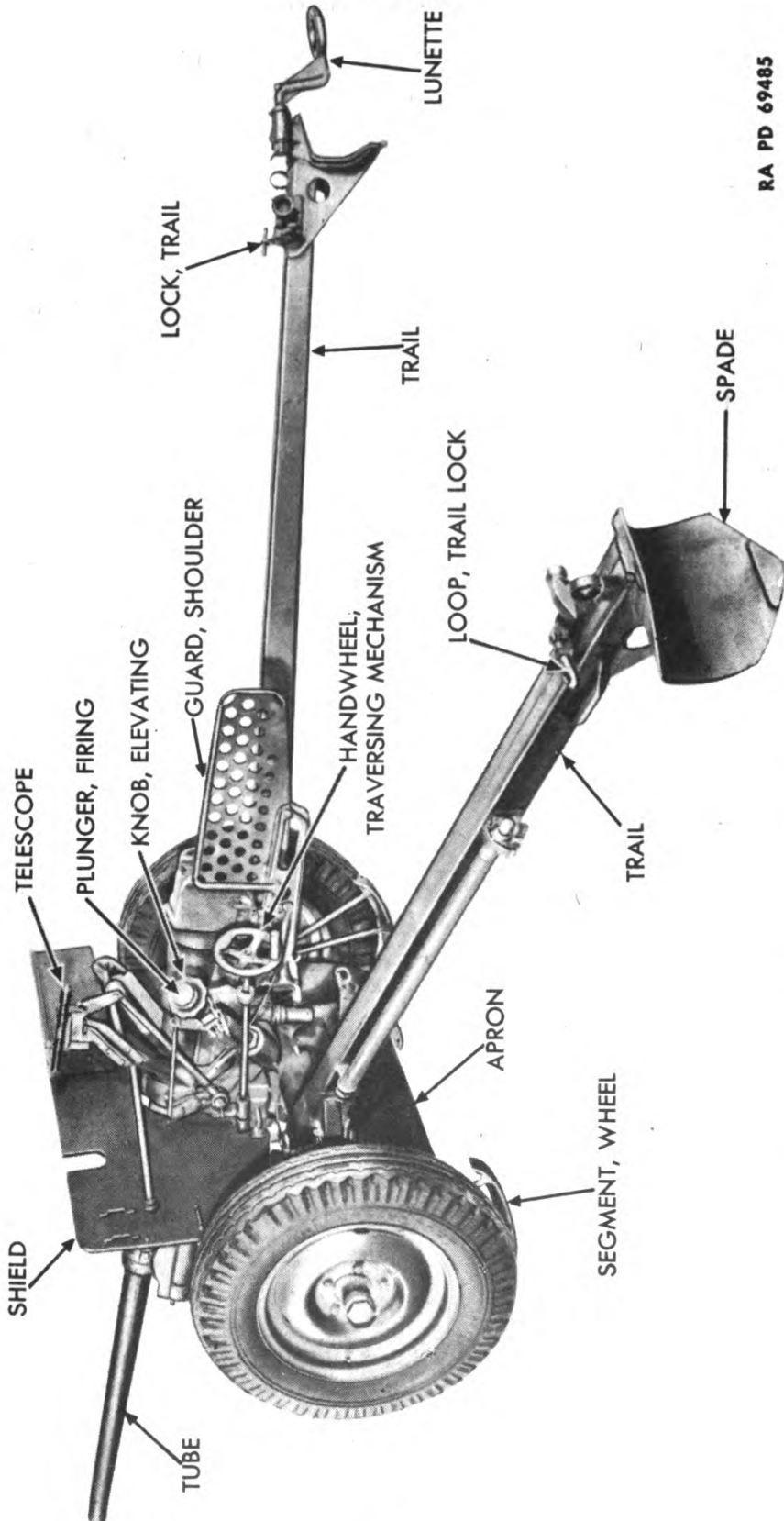


Figure 3 — 37-mm Gun M3 and Carriage M4 — Firing Position

**ORDNANCE MAINTENANCE — 37-MM ANTITANK GUNS M3 AND M3A1
AND CARRIAGES M4 AND M4A1**

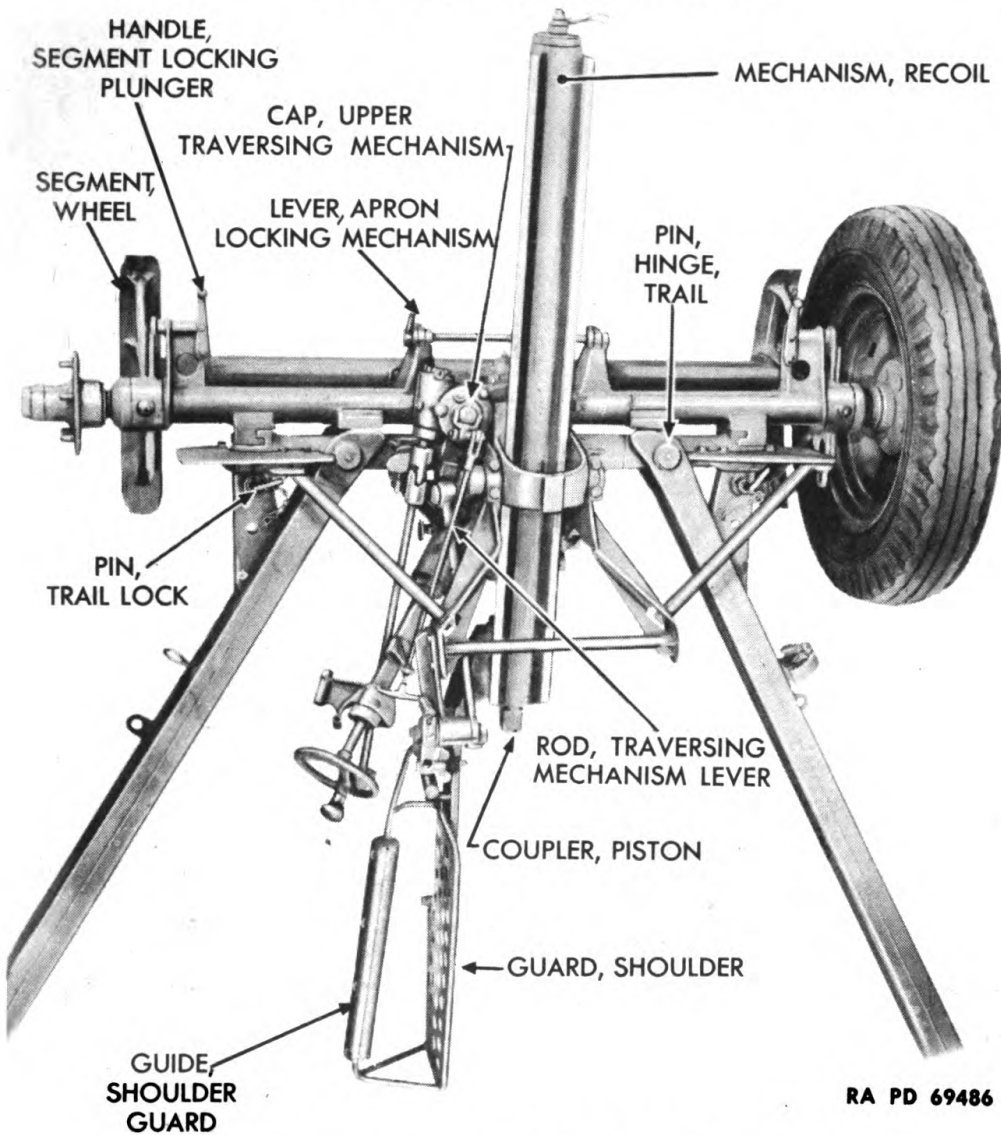


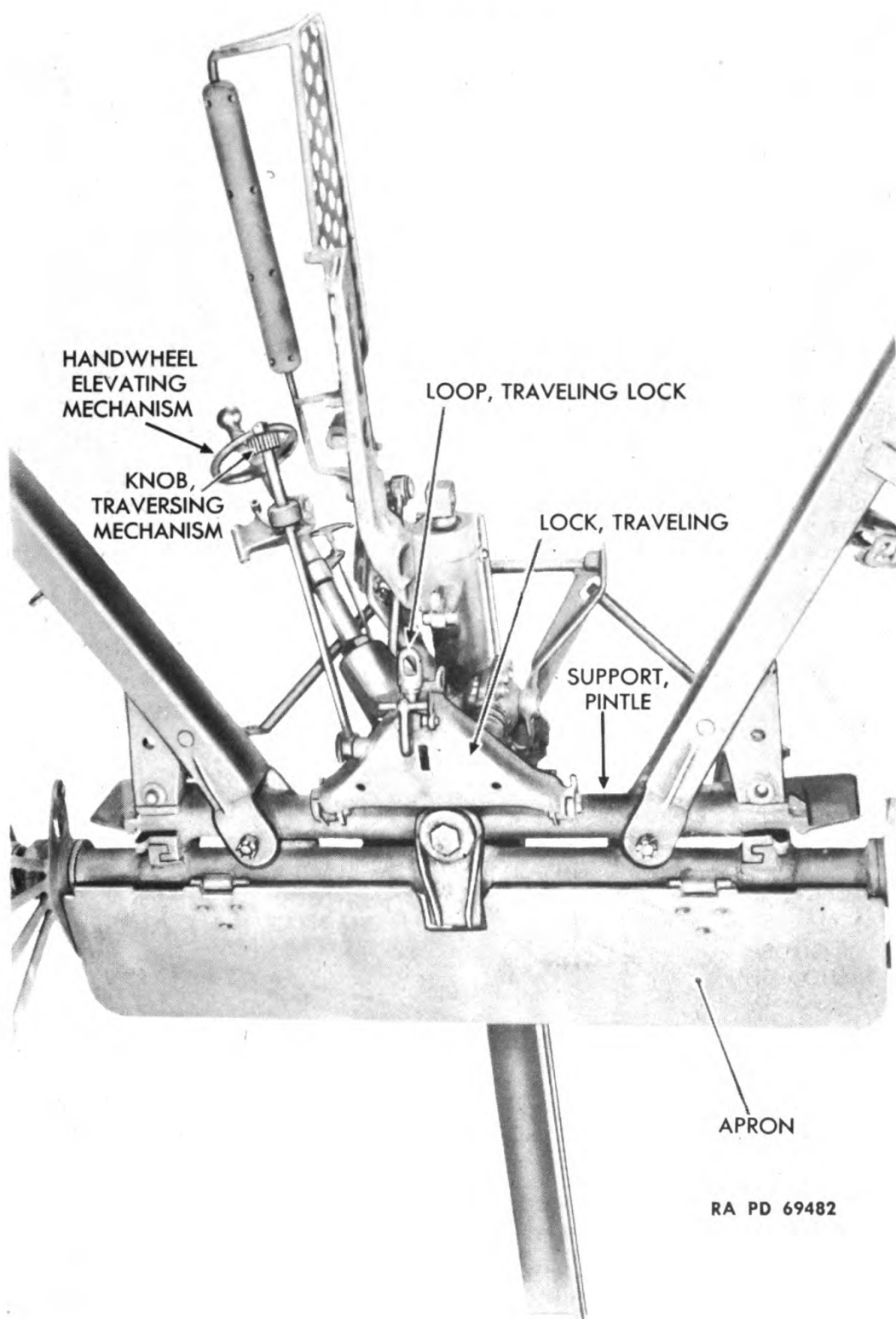
Figure 4 — Carriage M4A1 — Top View

traversing, and firing. The recoil mechanism is of the hydrospring type. A blackout light is provided to clamp on the tube and connect to the prime mover (fig. 6).

3. DIFFERENCES BETWEEN MODELS.

a. **Guns M3 and M3A1** (fig. 7). A number of M3 Guns were modified to provide for the assembly of a gas deflector and were designated 37-mm Gun M3A1. The modification consisted of threading the muzzle of the M3 tube to allow for installation of the deflector. While gas deflectors are no longer used on these guns, the modified M3 Guns with threaded tubes are still designated M3A1.

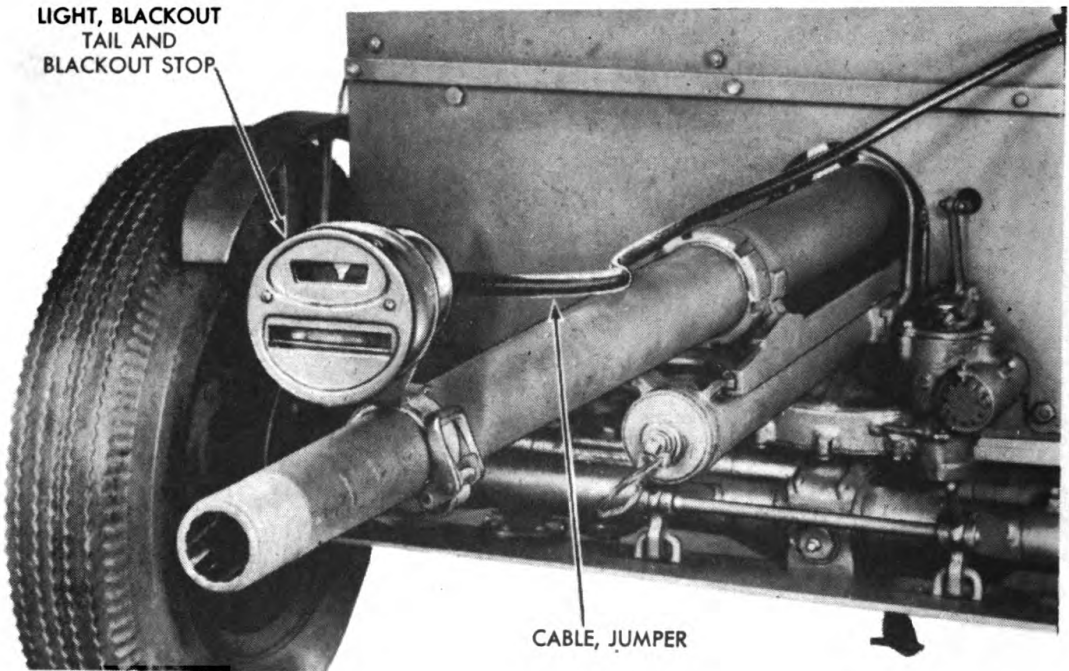
INTRODUCTION



RA PD 69482

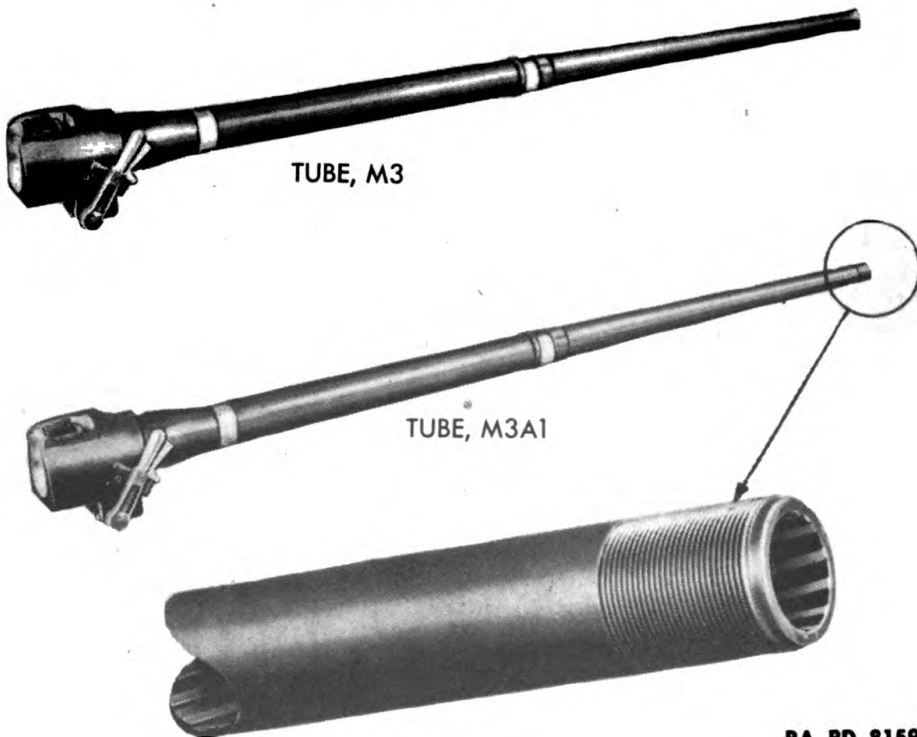
Figure 5 — Carriage M4A1 — Bottom View

ORDNANCE MAINTENANCE — 37-MM ANTITANK GUNS M3 AND M3A1
AND CARRIAGES M4 AND M4A1



RA PD 81584

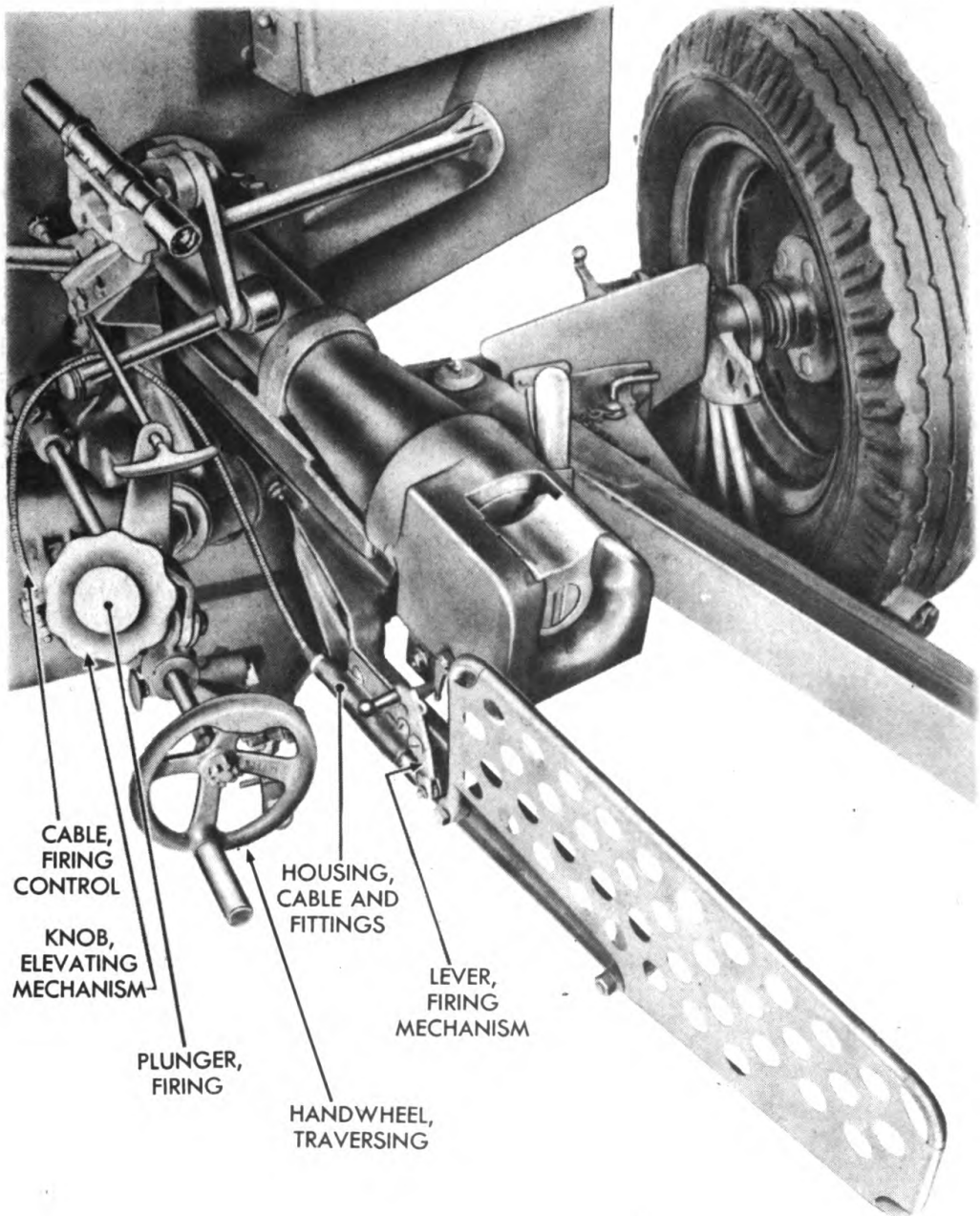
Figure 6 — Blackout Light



RA PD 81598

Figure 7 — 37-mm Gun Tubes M3 and M3A1

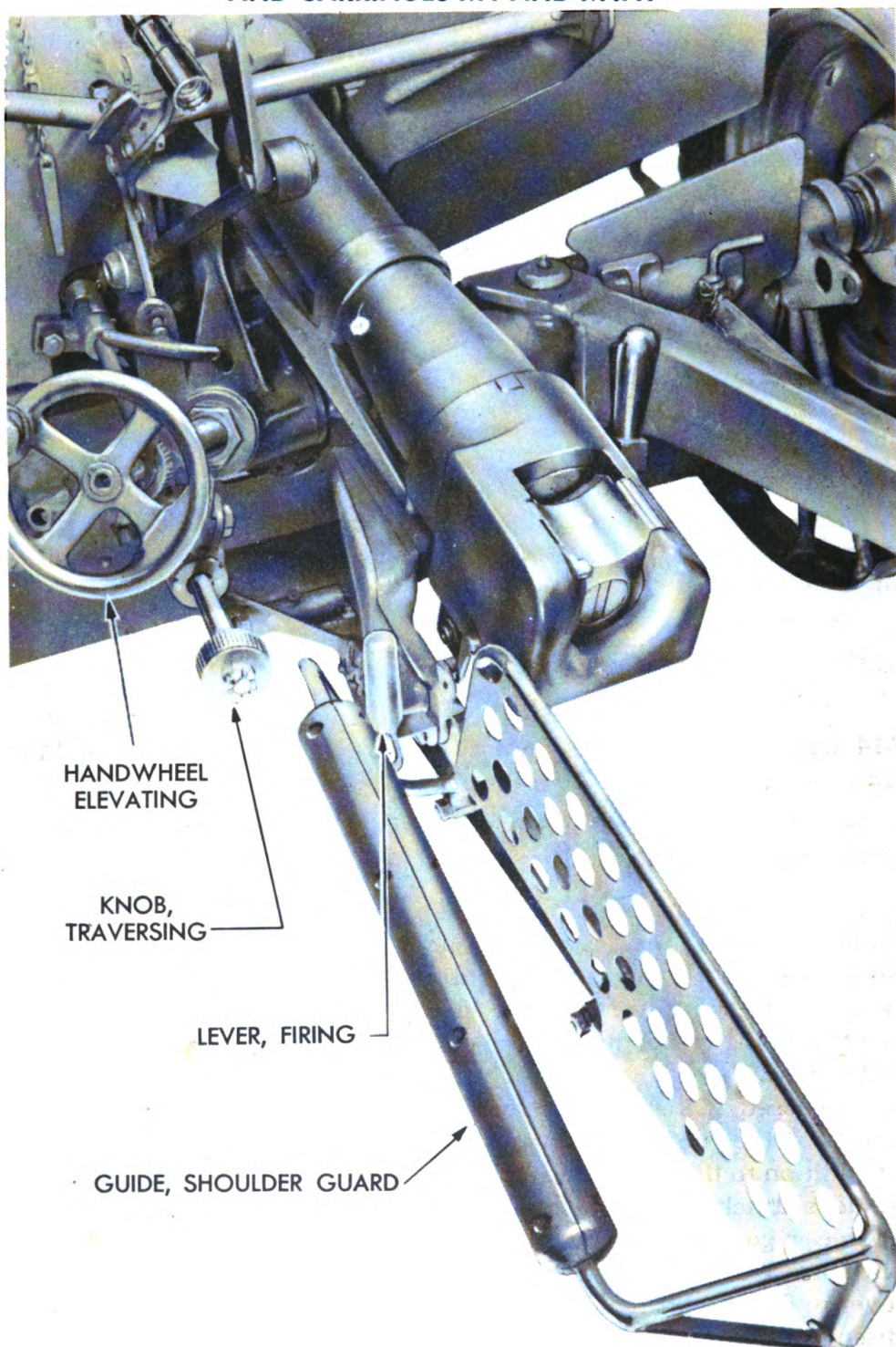
INTRODUCTION



RA PD 69495

Figure 8 — Elevating, Traversing, and Firing Controls on Carriage M4, Showing Variations from Carriage M4A1

**ORDNANCE MAINTENANCE — 37-MM ANTITANK GUNS M3 AND M3A1
AND CARRIAGES M4 AND M4A1**



HANDWHEEL
ELEVATING

KNOB,
TRAVERSING

LEVER, FIRING

GUIDE, SHOULDER GUARD

RA PD 81525

**Figure 9 — Elevating, Traversing, and Firing Controls on the Carriage
M4A1, Showing Variations from Carriage M4**

INTRODUCTION

b. Carriages M4 and M4A1 (figs. 8 and 9).

(1) **FIRING CONTROLS.** The firing controls on the M4 Carriage consist of a firing plunger, link, cable and fittings, firing mechanism plunger, and firing mechanism lever. When the firing plunger in the center of the elevating knob is pushed, the action is transmitted through the link, cable, firing mechanism plunger, and firing mechanism lever. This lever bears directly against the trigger. A handle on the lever is also provided for direct operation of the lever. On the M4A1, the firing controls consist of a firing lever and bracket assembled to the shoulder guard support. When the firing lever is pulled back, a lug on the right side of the lever operates directly on the trigger. The various plungers, links, springs, and cables of the M4 firing controls are eliminated on the M4A1.

(2) **ELEVATING MECHANISM.** The elevating mechanism on the M4 is controlled by an elevating knob through which the firing plunger passes. On the M4A1, the elevating mechanism is operated by an elevating handwheel, and is in no way connected with the firing controls.

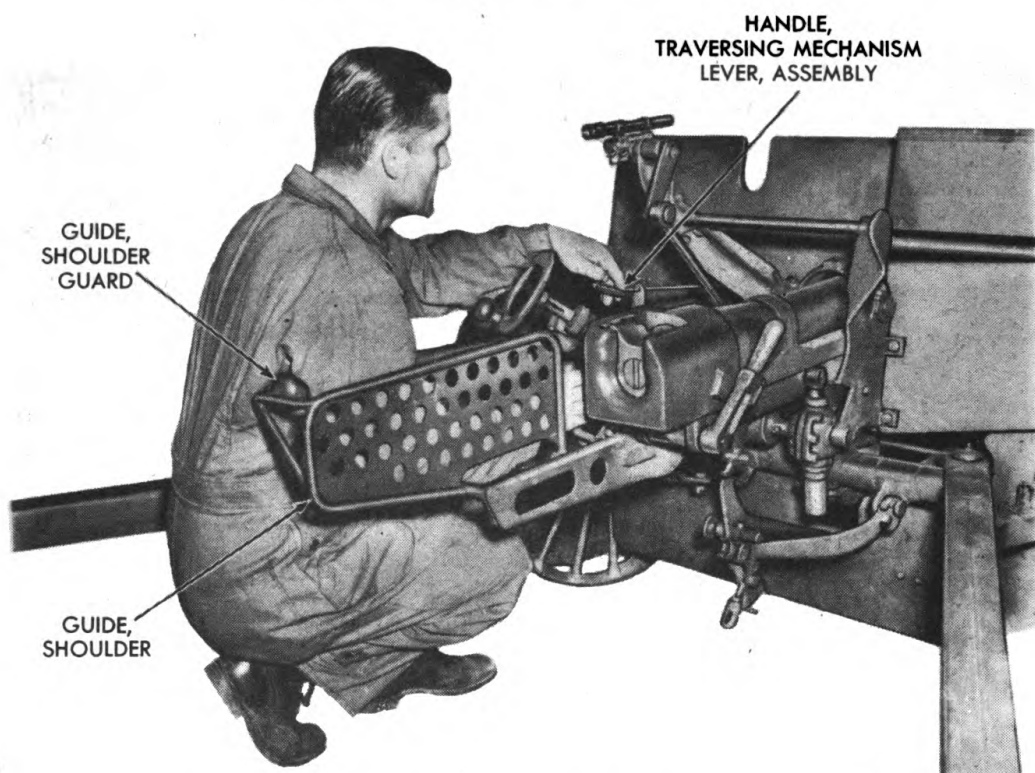
NOTE: These differences have no effect upon the internal operation of the elevating mechanism.

(3) **TRAVERSING MECHANISM.** The traversing mechanism on the M4 Carriage is operated by a traversing handwheel. On the M4A1 Carriage, it is operated by a traversing knob.

NOTE: These differences have no effect upon the internal operation of the traversing mechanism.

(4) Adjustments in traverse on the M4 Carriage are normally made by use of the traversing handwheel. A traversing mechanism lever, yoke, rod, and handle assembly is also provided to make possible rapid changes in traverse. When the handle is pulled back, it disengages the traversing mechanism clutch and permits free movement of the gun in traverse. No lock is provided to hold the handle to the rear, and when it is released, the action of a spring automatically reengages the clutch and locks the gun to the traversing mechanism. On the M4A1 Carriage, in addition to the traversing knob for normal traverse, a shoulder guard guide is attached to the left of, and parallel to, the shoulder guard. This enables a gunner to traverse rapidly by pushing or pulling on the guide with his right arm and shoulder, while his right hand engages the firing lever to fire the gun (fig. 10). The traversing mechanism clutch can be disengaged in the same manner as on the M4 Carriage, to allow rapid traversing. In addition, the clutch can be locked in the disengaged position by pulling back on the traversing mechanism lever rod handle, and rotating it through 90 degrees while it is in the retracted position. To reengage the clutch, the handle is again pulled to the rear, rotated through 90 degrees, and released.

ORDNANCE MAINTENANCE — 37-MM ANTITANK GUNS M3 AND M3A1
AND CARRIAGES M4 AND M4A1



RA PD 49925

Figure 10 — Operating the Traversing (Quick Release) Mechanism on the Carriage M4A1

4. DATA.

Weight of gun	191 lb
Total weight of gun and carriage, firing position	912 lb
Height of lunette (limbered position)	29½ in.
Height of bore from ground (on wheels)	25¾ in.
Length of carriage from muzzle to lunette	154½ in.
Width over hub caps	63½ in.
Width of tread (center of wheels)	56 in.
Height over-all carriage (traveling)	37⅞ in.
Trail spread, maximum (included angle)	60 deg
Elevation, maximum	15 deg
Depression, maximum	10 deg
Traverse, maximum, right	30 deg
Traverse, maximum, left	30 deg

INTRODUCTION

Force required at handwheels:

To elevate	5½ lb
To depress	5 lb
To traverse	2 lb

Recoil mechanism:

Normal recoil	20 in.
Maximum recoil	20½ in.

Recoil cylinder is filled with 5 pints of recoil oil

Tires:

Tire, combat	6.00 x 16
Tubes, inner, combat	6.00 x 16
Tire pressure	10 lb

ORDNANCE MAINTENANCE — 37-MM ANTITANK GUNS M3 AND M3A1
AND CARRIAGES M4 AND M4A1

Section II

DISASSEMBLY AND ASSEMBLY

	Paragraph
General	5
Tools	6
Breechblock	7
Breech ring	8
Tube	9
Sleigh	10
Telescope mount M19	11
Shoulder guard support, shoulder guard, and shoulder guard guide	12
Recoil mechanism	13
Shield, apron locking mechanism, apron, and guards	14
Firing mechanism controls	15
Elevating mechanism	16
Traversing mechanism	17
Top carriage	18
Trails	19
Wheel, hub, and tire	20
Wheel segment and segment latch	21
Traveling lock	22
Axle and pintle support	23

5. GENERAL.

a. Care should be taken at all times during disassembly and assembly to keep parts in order, and to keep them clean. Parts should be handled carefully so as not to crack, nick, or break them. If it is necessary to tap or strike finished parts, only a brass, copper or rawhide hammer or drift should be used.

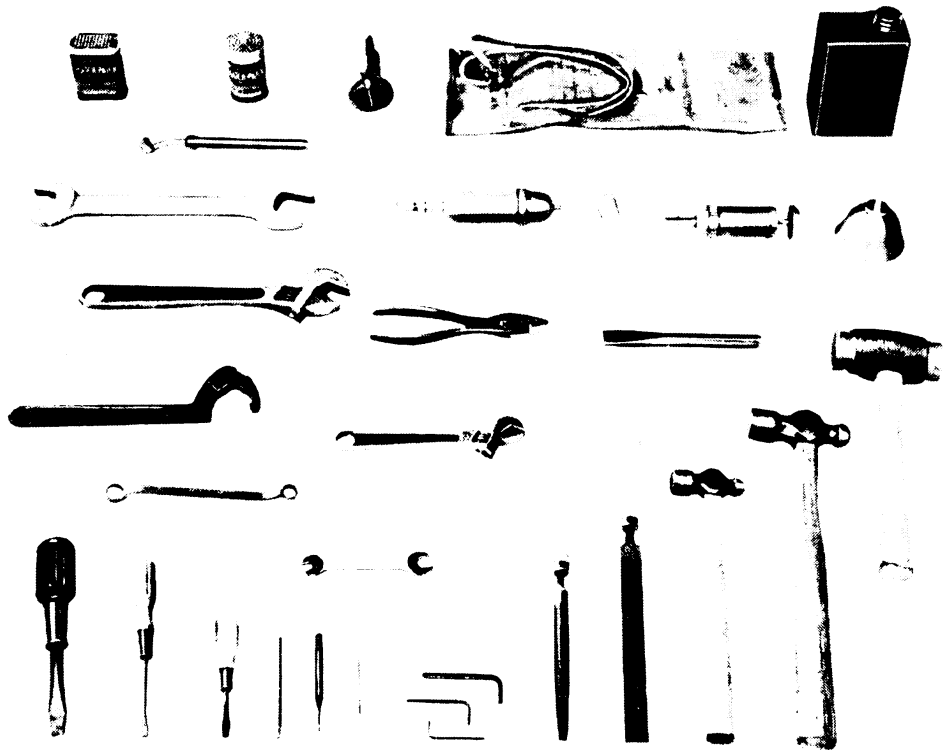
6. TOOLS.

a. **Standard.** The standard tools needed for the disassembly and assembly of the gun and carriage include a complement of standard wrenches, screwdrivers, pliers, punches, pin drifts, and hammers (fig. 11).

b. **Special.** The special tools needed for disassembly and assembly include:

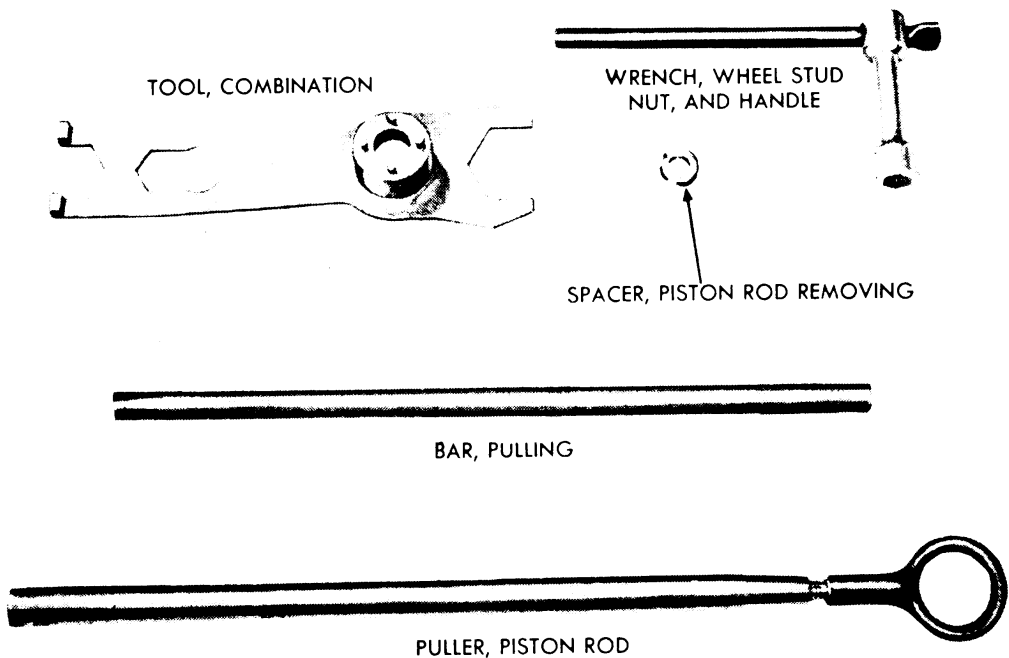
(1) **TOOL COMBINATION** (fig. 12). This tool is used to remove the wheel hubs, the pintle nut, and the piston packing in the recoil mecha-

DISASSEMBLY AND ASSEMBLY



RA PD 81590

Figure 11 — Standard Tools for Disassembly and Assembly



RA PD 81529

Figure 12 — Special Tools for Disassembly and Assembly

ORDNANCE MAINTENANCE — 37-MM ANTITANK GUNS M3 AND M3A1
AND CARRIAGES M4 AND M4A1

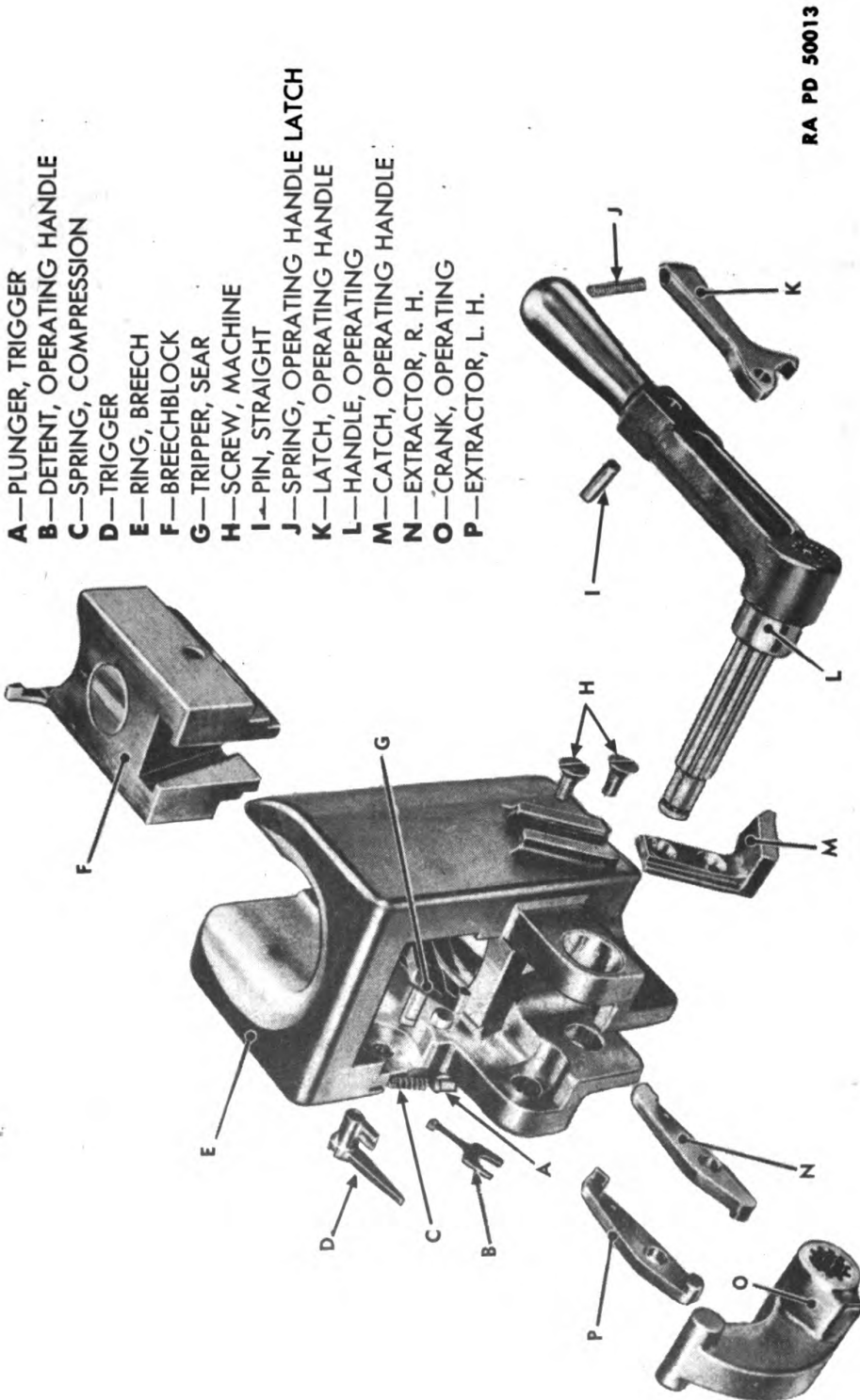
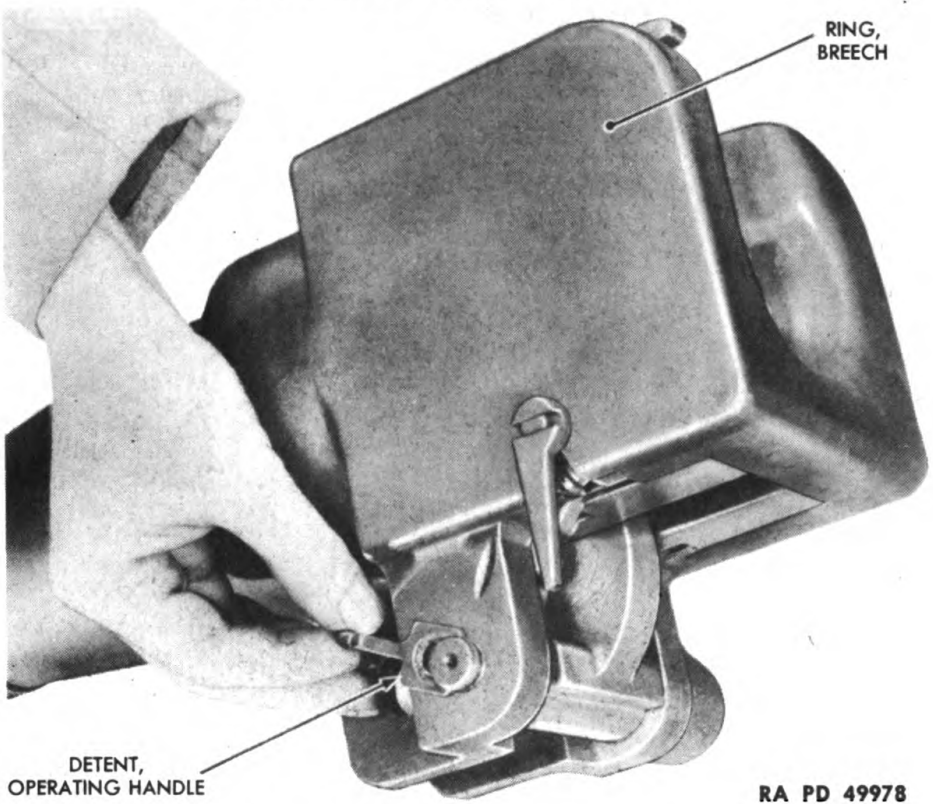


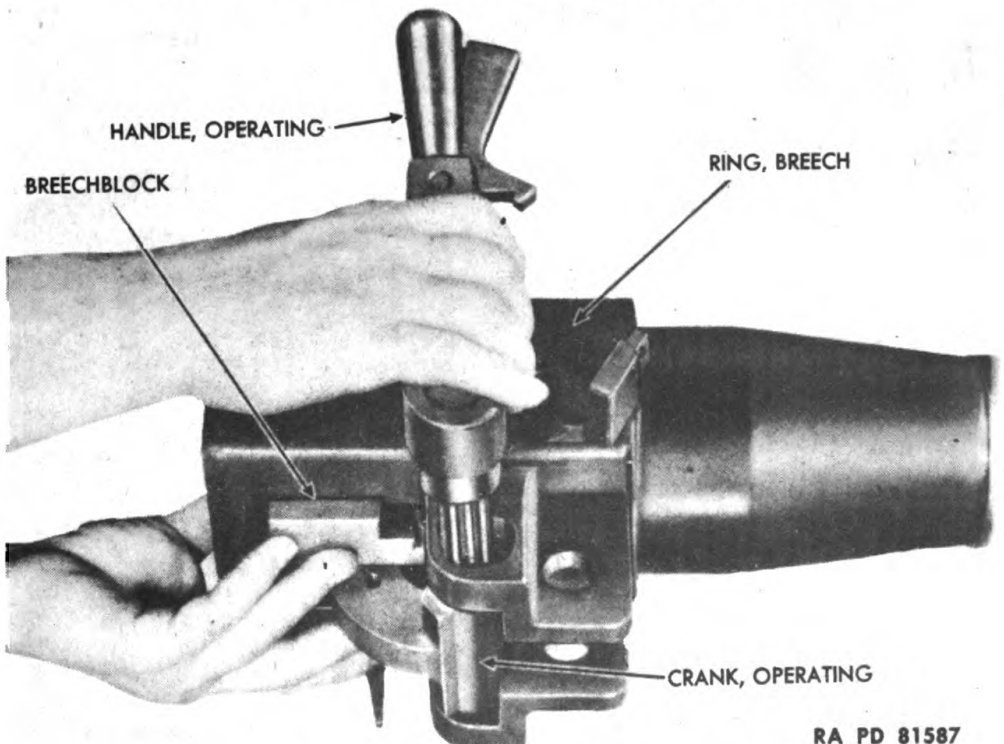
Figure 13 — Breech Ring — Exploded View

DISASSEMBLY AND ASSEMBLY



RA PD 49978

Figure 14 — Removing the Operating Handle Detent



RA PD 81587

Figure 15 — Removing the Operating Handle

ORDNANCE MAINTENANCE — 37-MM ANTITANK GUNS M3 AND M3A1
AND CARRIAGES M4 AND M4A1

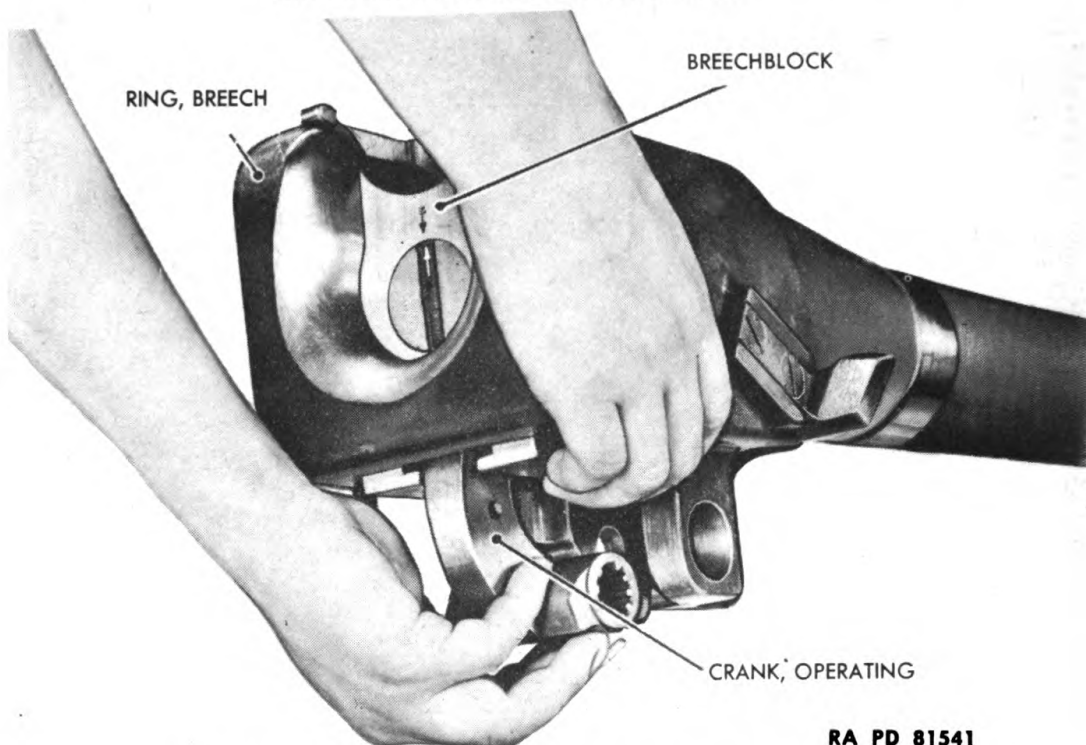


Figure 16 — Removing the Operating Crank

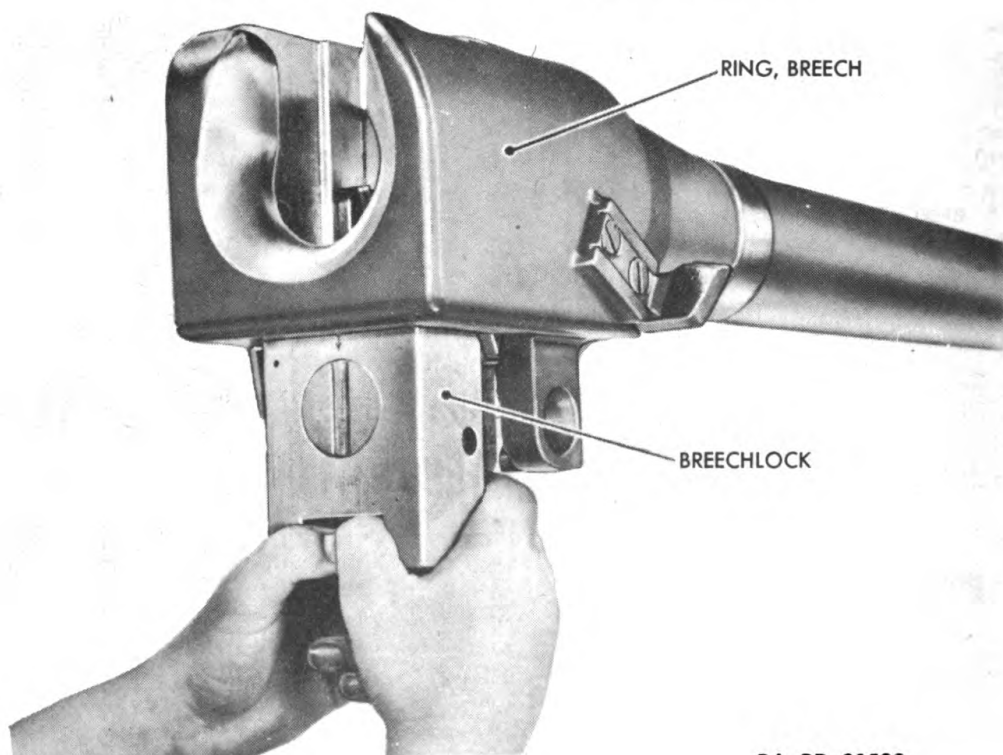


Figure 17 — Removing the Breechblock

DISASSEMBLY AND ASSEMBLY

RA PD 69405

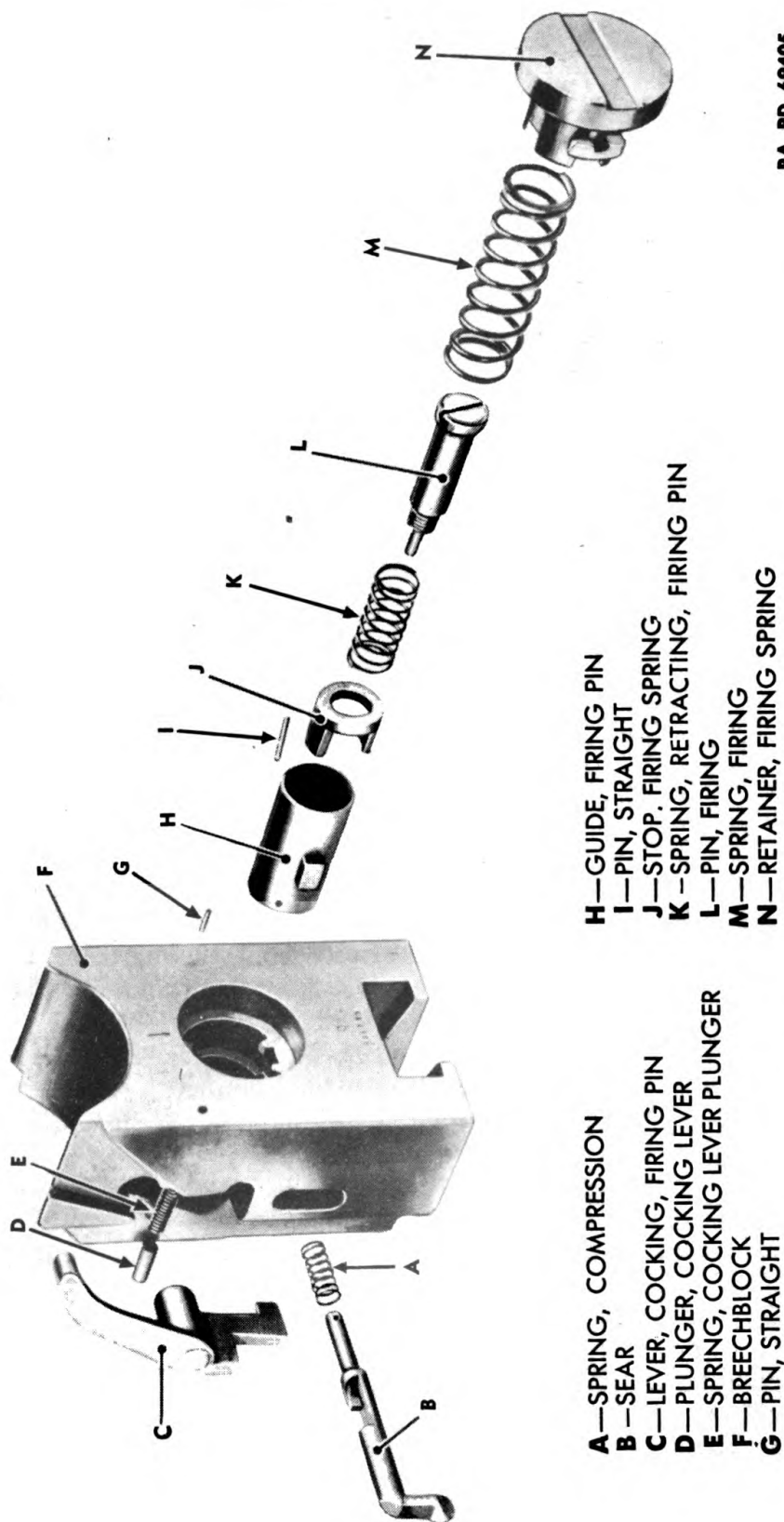


Figure 18 — Breechblock — Exploded View

ORDNANCE MAINTENANCE — 37-MM ANTITANK GUNS M3 AND M3A1
AND CARRIAGES M4 AND M4A1

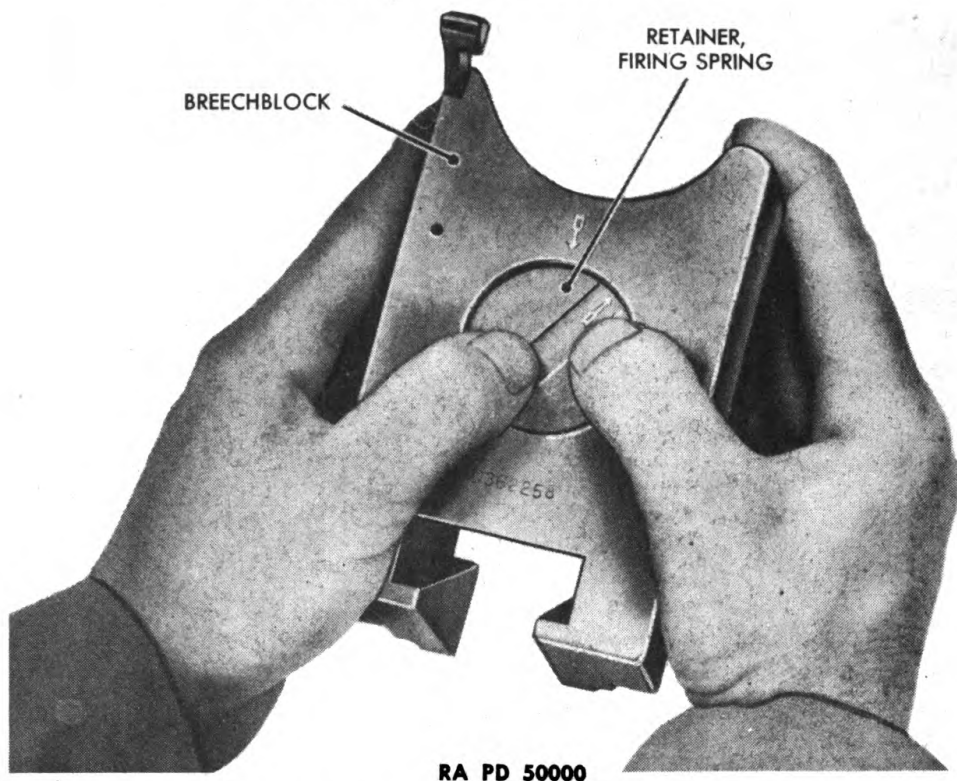


Figure 19 — Removing the Firing Spring Retainer

nism. The large open end is for the wheel hubs and pintle nut. The other end with two lugs protruding from the prongs is used for removing the piston packing housing follower from the recoil mechanism. The part of the tool which is made up of four pins sticking from the raised knob near the center of the wrench is used for removing the piston packing gland follower.

(2) **PULLER, PISTON ROD** (fig. 12). This tool is used in the removal of the counterrecoil spring from the recoil cylinder.

(3) **BAR, PULLING** (fig. 12). This is used as a handle when inserted through the loop or eye of the piston rod puller.

(4) **SPACER, PISTON ROD REMOVING** (fig. 12). This spacer is used in the disassembly of the recoil mechanism.

(5) **WRENCH, WHEEL STUD NUT AND HANDLE, WRENCH, WHEEL STUD NUT** (fig. 12). These are used to remove and install the wheel stud nuts.

7. BREECHBLOCK.

a. Removal (fig. 13).

(1) Remove the operating handle detent by springing its single extension down and out of its seat in the left side of the breech ring (fig. 14).

DISASSEMBLY AND ASSEMBLY

(2) Support the breechblock from below with the left hand and with the right hand depress the operating handle latch and draw the operating handle out to the right (fig. 15). As the right hand supports the breechblock, pull the operating crank out of its lugs in the breech ring (fig. 16). Then let the breechblock drop sufficiently to allow the operating crank to slip out of its slot in the rear of the breechblock and remove the breechblock from the breech ring by pulling it down (fig. 17).

NOTE: As an alternative method of removing the breechblock from the breech ring, the firing mechanism is first removed from the breechblock (par. 8 a). The breechblock then drops out easily as the operating handle is removed.

h. Disassembly (fig. 18).

(1) Tap the straight pin out of its hole in the operating handle and lift the operating handle latch and operating handle latch spring from the handle.

(2) Depress the sear to release the compression of the firing spring (fig. 18). Press the firing spring retainer in against the firing spring and rotate the retainer one-quarter turn (fig. 19). Slowly release the pressure. This allows the firing spring retainer to disengage from the breechblock and permits the firing spring to force the firing spring retainer out. Then throw the firing pin cocking lever forward. This will force the firing spring and the assembled firing pin, firing pin retracting spring, firing spring stop, and firing pin guide out of the block (fig. 20).

NOTE: The firing mechanism may be removed from the breechblock when the breechblock is in or out of the breech ring.

(3) Tap the straight pin from the front end of the firing pin guide and unscrew the firing pin from the firing pin guide (fig. 21). The firing pin, firing pin retracting spring, and firing spring stop can then be easily removed from the guide.

(4) Place the breechblock on its side with the firing pin cocking lever facing up. Hold a finger against the cocking lever plunger to depress the cocking lever plunger spring. Lift the firing pin cocking lever from the breechblock and withdraw the cocking lever plunger and cocking lever plunger spring (fig. 22).

(5) Press the sear in so that its end will protrude from the opposite side of the breechblock (fig. 23). This will permit the withdrawal of the straight pin which retains the sear in the breechblock. The sear and sear compression spring can then be withdrawn from the breechblock (fig. 24).

(6) Drill a hole in the face of the breechblock bushing large enough to insert a $\frac{3}{8}$ -inch drift and unscrew the bushing by tapping the drift sideways with a hammer.

NOTE: The bushing should be removed only if the firing pinhole is worn.

ORDNANCE MAINTENANCE — 37-MM ANTITANK GUNS M3 AND M3A1
AND CARRIAGES M4 AND M4A1

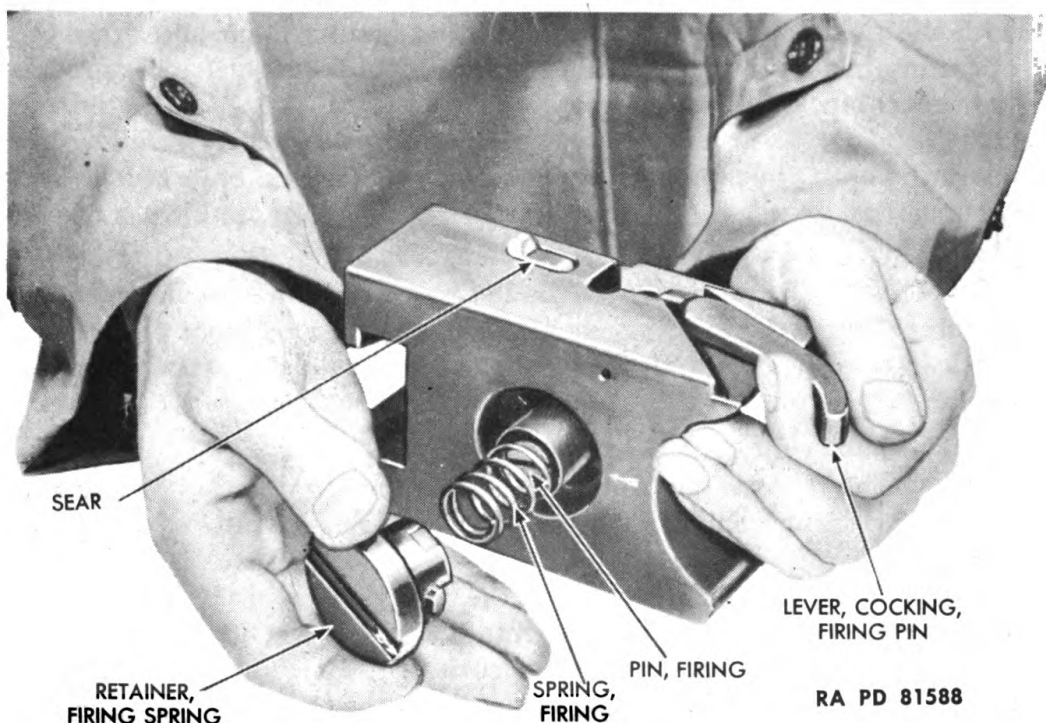


Figure 20 — Removing the Firing Pin Assembly

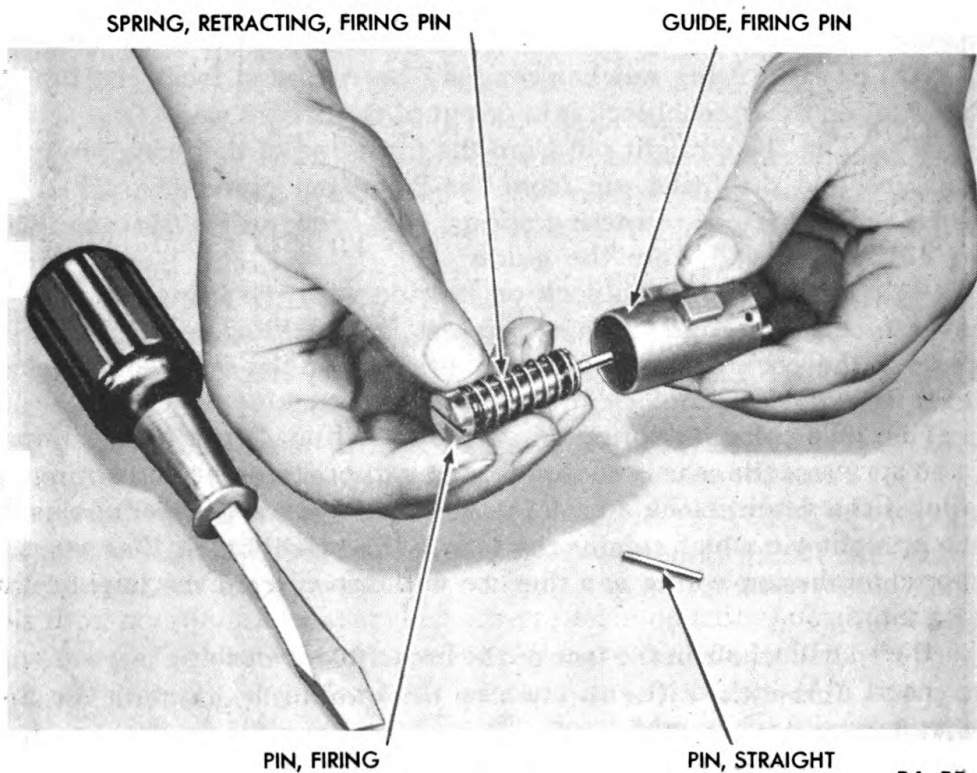


Figure 21 — Removing the Firing Pin

DISASSEMBLY AND ASSEMBLY

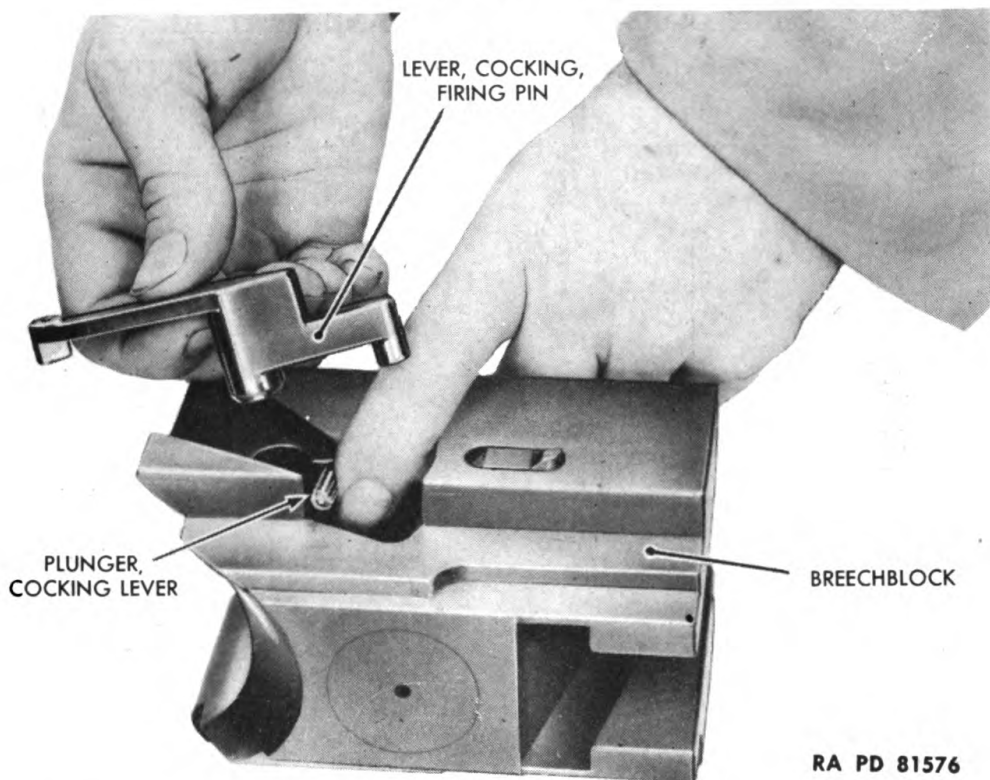


Figure 22 — Removing the Firing Pin Cocking Lever, Cocking Lever Plunger, and Cocking Lever Plunger Spring

c. Assembly.

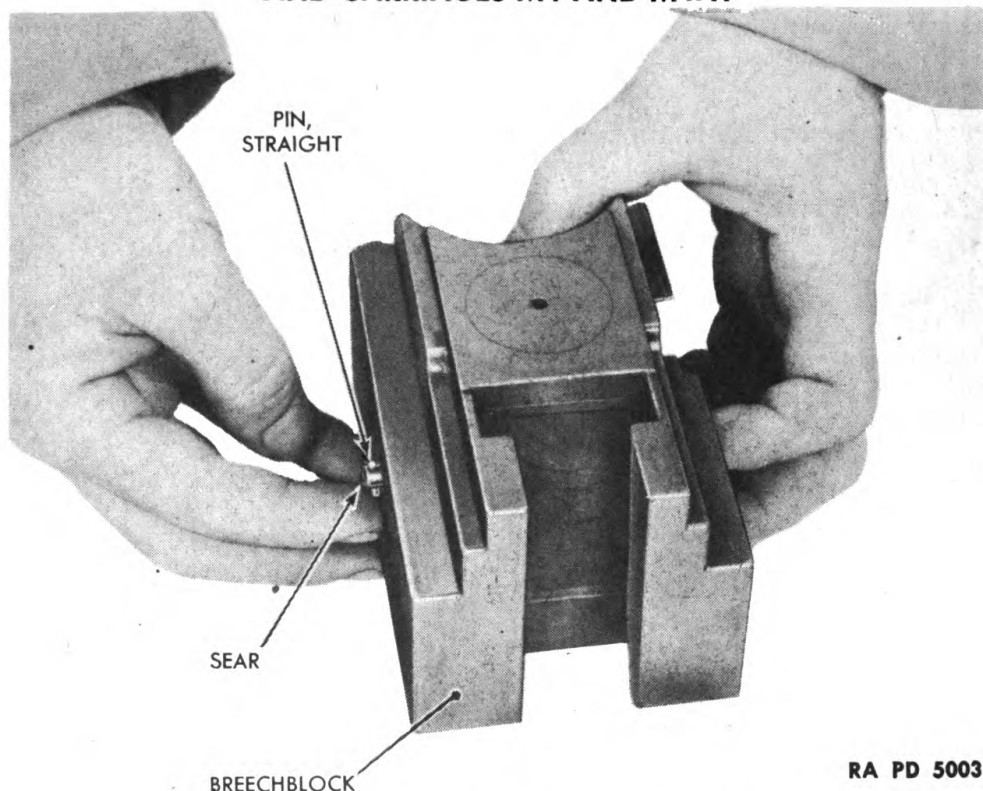
(1) To assemble the operating handle latch into operating handle, insert the latch into the handle recess. Insert and guide the operating handle latch spring into its bearing hole in the rear edge of the latch. Depress the latch and insert the straight pin. Stake both ends of the pin to retain it in position.

(2) If the breechblock bushing has been removed, screw in a new one. Saw or mill the bushing flush with the face of the breechblock and file and polish the bushing face.

(3) To assemble the sear into the breechblock, place the compression spring on the small end of the sear. Insert the sear and spring into their slotted hole in the breechblock (fig. 24). Press the sear against the compression spring until the pinhole in the small end of the sear is exposed on the opposite side of the breechblock. Insert the straight retaining pin through this hole, letting the ends project equally on both sides of the sear (fig. 23). Release the pressure on the sear.

(4) Insert the firing spring stop into the firing pin guide, pronged end first, and rotate it until the prongs enter and protrude through the holes in the end of the guide (fig. 18). Place the retracting spring on the body of the firing pin and screw the firing pin into the guide until

ORDNANCE MAINTENANCE — 37-MM ANTITANK GUNS M3 AND M3A1 AND CARRIAGES M4 AND M4A1



RA PD 50031

Figure 23 — Removing the Straight Pin from the Sear

the shoulder on the pin contacts the forward end of the guide on the inside (fig. 21). The point of the firing pin and the prongs of the stop will then protrude from the forward end of the guide. If the transverse locking pinholes in the pin and guide are not in alinement, screw the firing pin backward, not to exceed one-half turn, to aline the holes. Insert the straight pin through the pin and guide. This pin should not protrude on either side of the guide.

(5) Insert the assembled firing pin and firing pin guide into the rear end of the firing pinhole in the breechblock, firing pin point first. Aline the exterior lugs of the guide with the grooves in the hole in the breechblock. Press on the sear and push the firing pin and guide forward until they contact the breechblock bushing; then release the pressure on the sear. Place the firing spring inside the firing pin guide around the firing pin. Place the cupped end of the firing spring retainer over the rear end of the firing spring and insert the retainer into the firing pinhole of the breechblock with the arrows in the slot of the head approximately horizontal (fig. 20). Press the retainer forward against the firing spring until the top of the retainer is approximately $\frac{1}{8}$ inch below the surface of the block and rotate it until the arrows are in alinement with the arrow on the face of the block; then release the pressure (fig. 19).

DISASSEMBLY AND ASSEMBLY

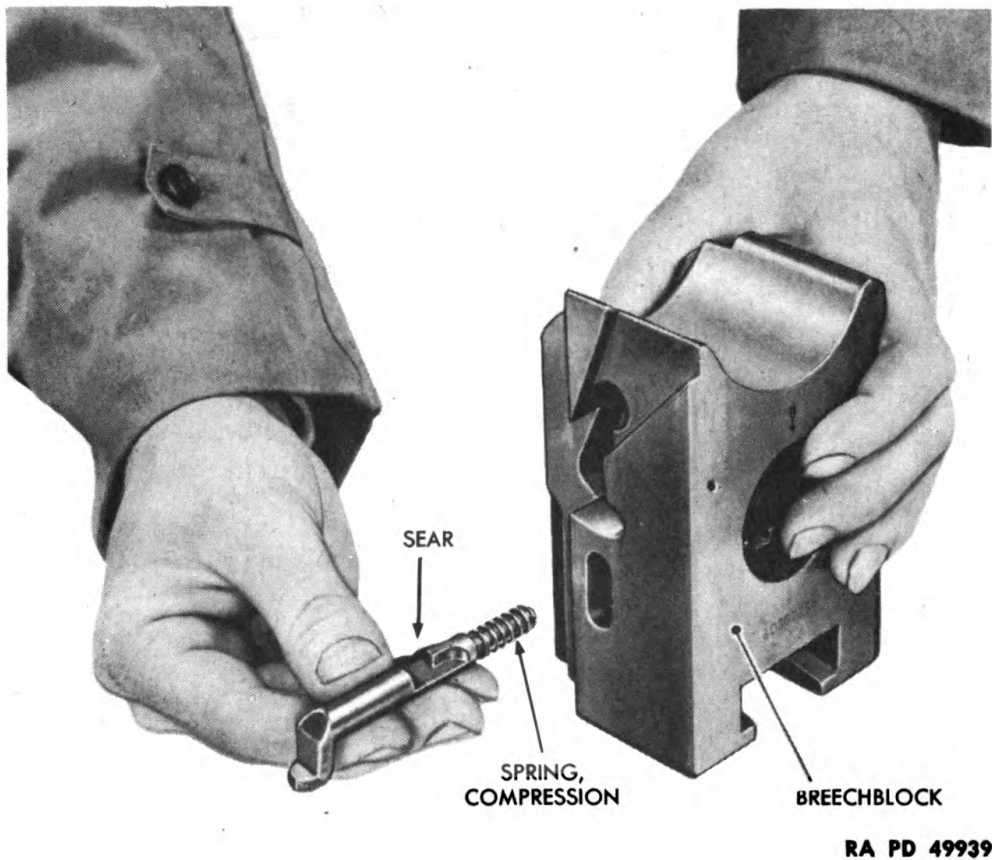


Figure 24 — Removing the Sear and Compression Spring

(6) **COCKING LEVER PLUNGER.** Insert the cocking lever plunger spring in its hole in the rear face of the recess on the left side of the breechblock. Insert the cocking lever plunger with the *flat end* against the spring. Press the plunger against the spring and drop the firing pin cocking lever into the recess with its short arm downward (fig. 22).

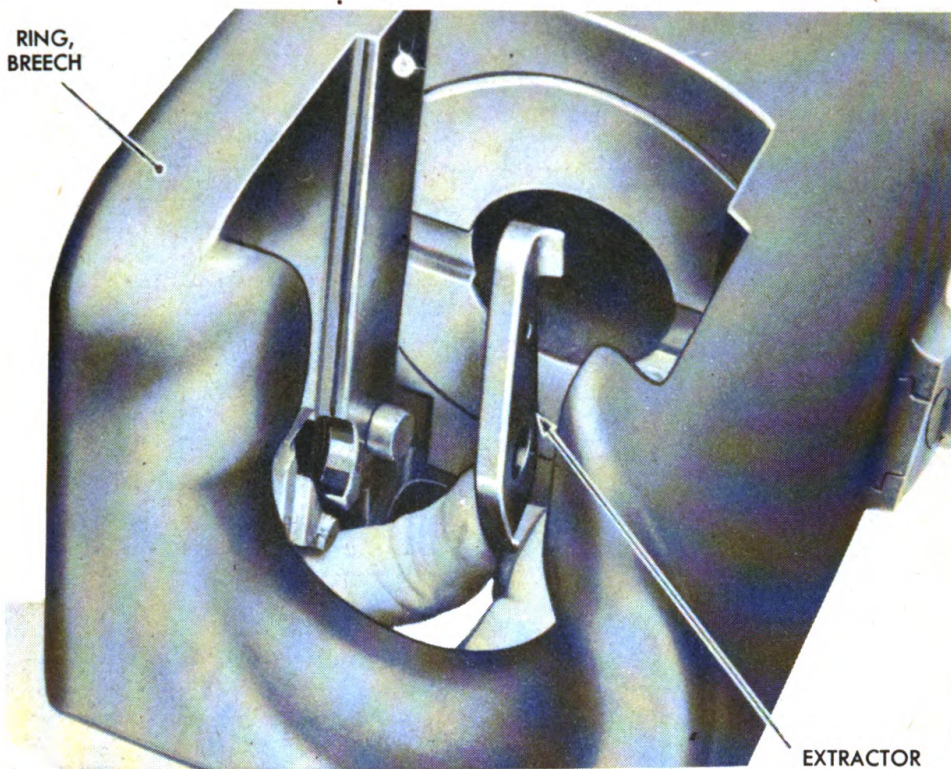
d. Installation.

(1) Swing the extractors forward to the limit of their throw. Depress the sear to make sure the firing mechanism is not cocked. Slide the breechblock into the top of the breech recess until the sear hits the side of the breech ring. Depress the sear to permit the breechblock to pass down through the breech recess until the slot for the operating crank is exposed below the breech ring. Slide the operating crank into its slot with the convex curve of the crank to the rear.

(2) Push the breechblock upward to approximately closed breech position and swing the operating crank into position between the lugs on the bottom of the breech ring (fig. 16).

(3) Push the breechblock up until its bottom is about $\frac{1}{2}$ inch below the bottom of the breech ring. With the right hand, run the shaft

ORDNANCE MAINTENANCE — 37-MM ANTITANK GUNS M3 AND M3A1
AND CARRIAGES M4 AND M4A1



RA PD 50043

Figure 25 — Removing the Extractors

of the operating handle through the right-hand lug of the breech ring into the crank holding the handle vertical (fig. 15). Throw the operating handle forward to engage the catch.

NOTE: With the breechblock and handle in the above positions, the double spline of the handle shaft will enter the double groove in the operating crank.

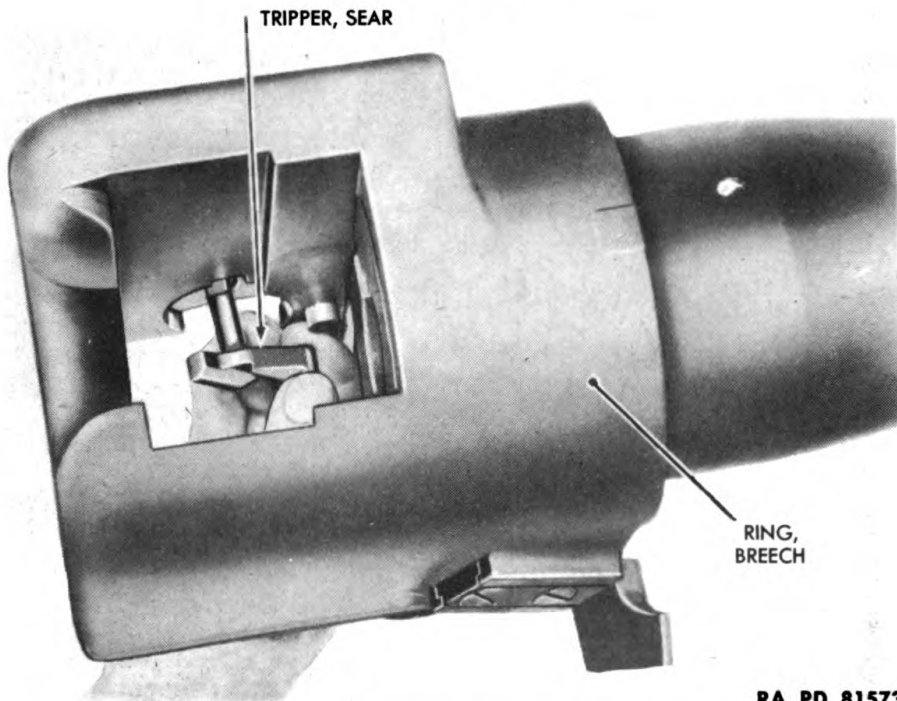
(4) With the flat side of the operating handle detent against the breech ring, slide the forked end from the rear into the groove in the left end of the operating handle shaft. Rotate the detent upward until it springs into its seat in the breech ring (fig. 14). Care should be taken not to deform the detent by excessive springing of the tip or a permanent "set" will result and defeat the purpose for which this detent is intended.

8. BREECH RING.

a. Removal (fig. 13).

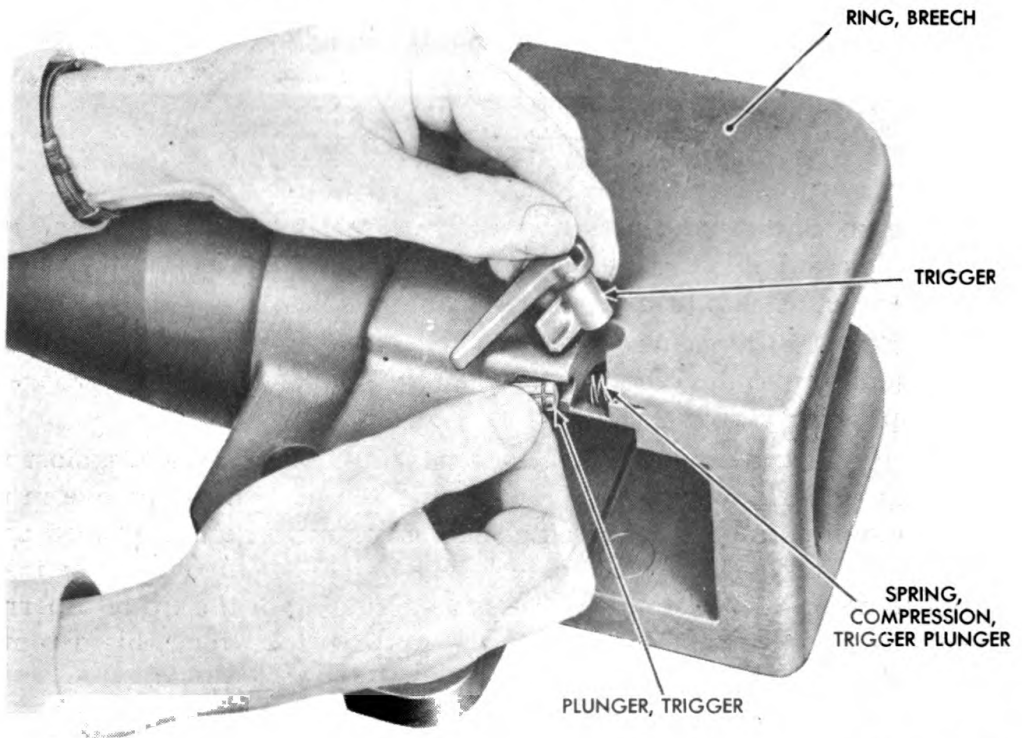
NOTE: The breech ring may be removed when the tube is on or off the carriage.

DISASSEMBLY AND ASSEMBLY



RA PD 81573

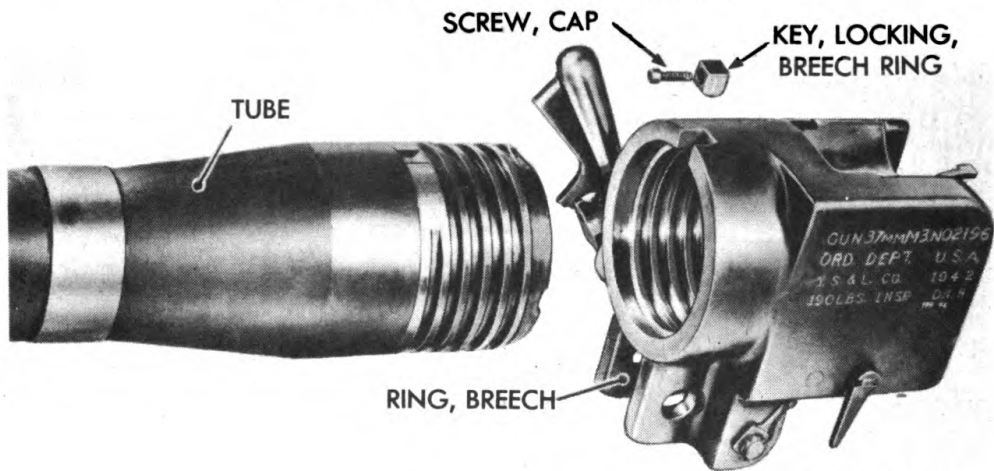
Figure 26 — Removing the Sear Tripper



RA PD 81580

Figure 27 — Removing the Trigger, Trigger Plunger, and Trigger Plunger Compression Spring

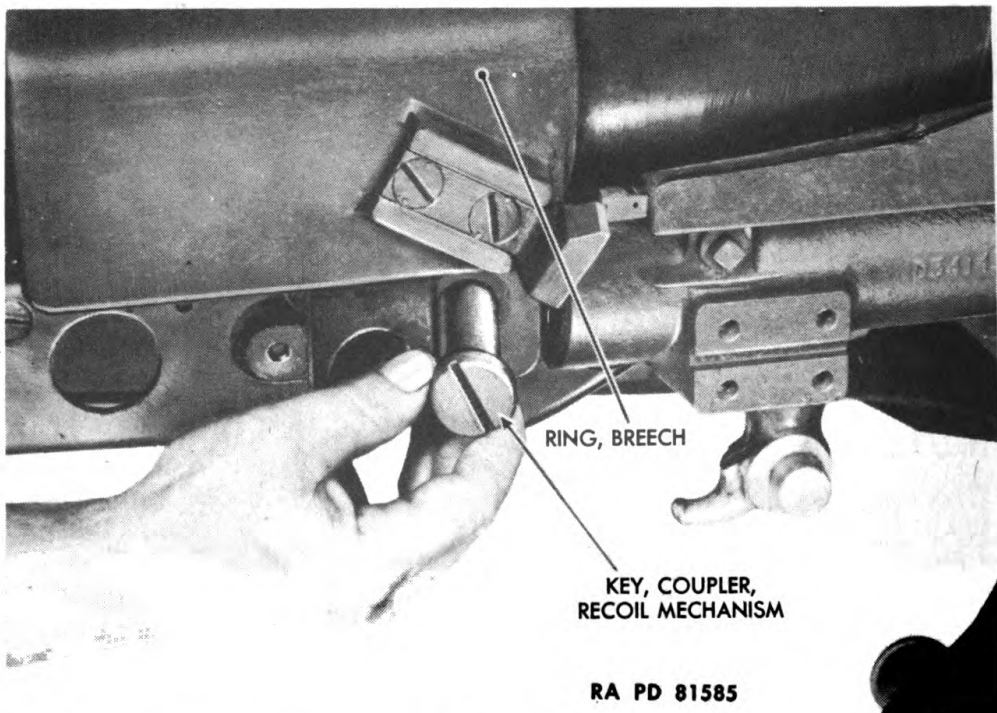
ORDNANCE MAINTENANCE — 37-MM ANTITANK GUNS M3 AND M3A1 AND CARRIAGES M4 AND M4A1



RA PD 49962

Figure 28 — Breech Ring and Tube

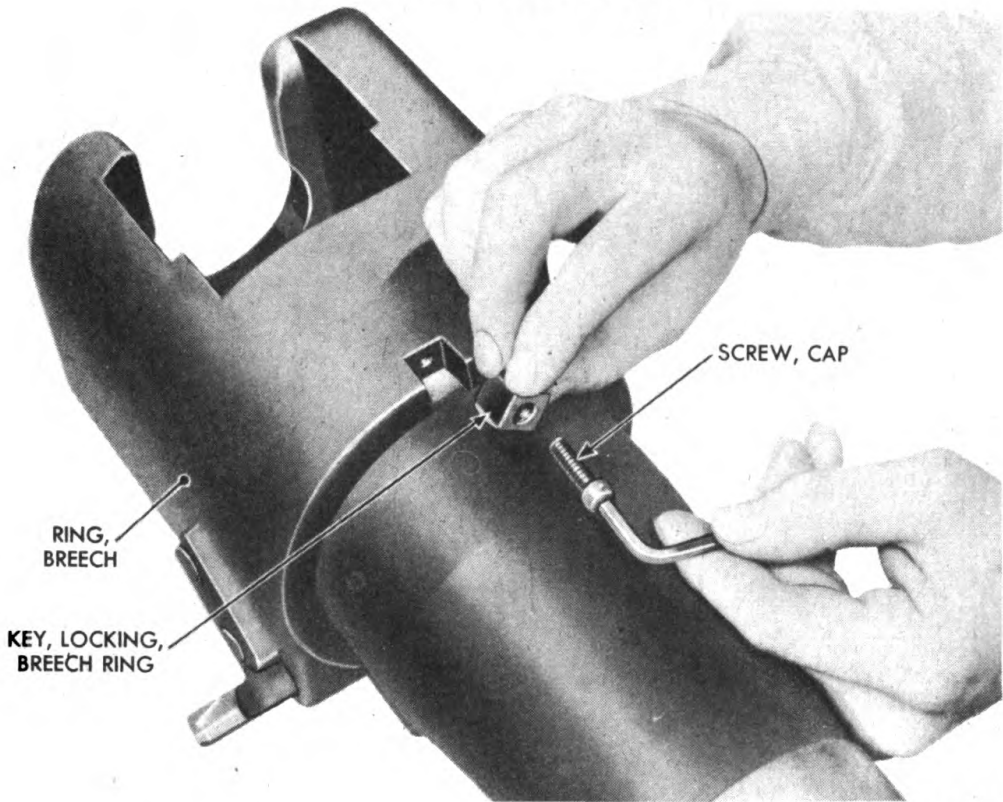
- (1) Remove the breechblock (par. 7 a).
- (2) Reach into the breech ring and slide the extractors from the lugs on which they ride (fig. 25). The extractors must be rotated to the vertical position before they can be removed from the lugs.
- (3) Reach into the breech recess and withdraw the sear tripper from the trigger and from the circular slot in the left side of the breech ring (fig. 26).



RA PD 81585

Figure 29 — Removing the Recoil Mechanism Coupler Key

DISASSEMBLY AND ASSEMBLY



RA PD 49949

Figure 30 — Removing the Breech Ring Locking Key

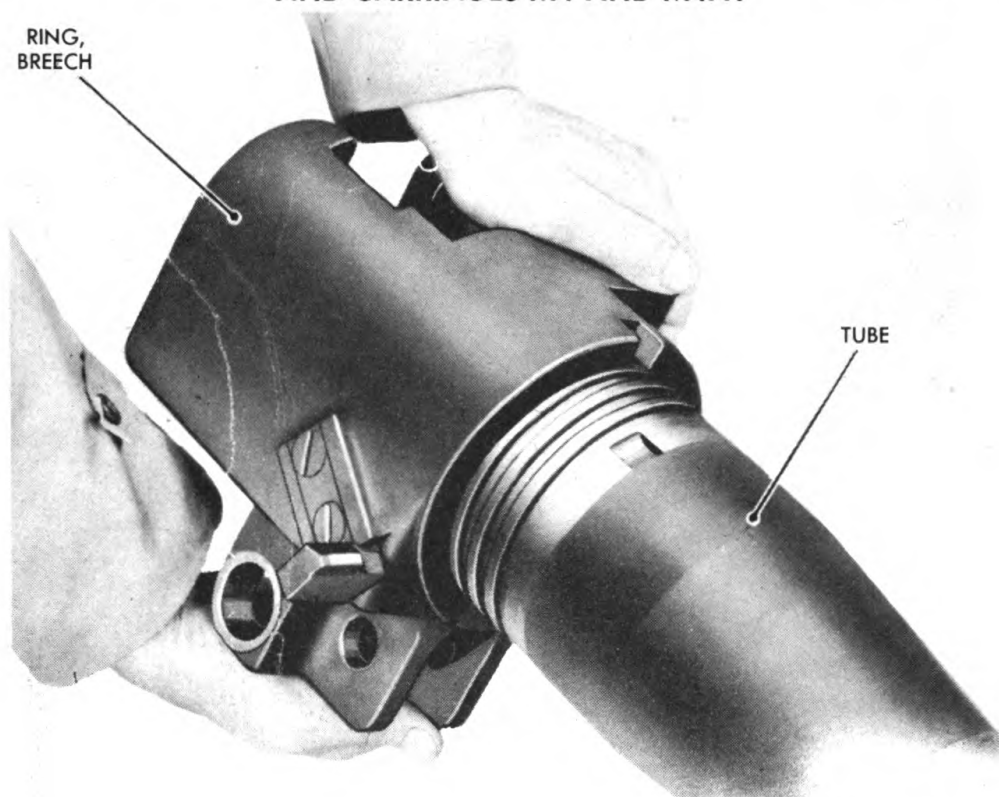
(4) Insert the tip of the forefinger upward between the trigger and trigger plunger and press the trigger plunger rearward to free the lug on the trigger while pulling the trigger out to the left (fig. 27). The compression of the trigger plunger compression spring will force out the trigger plunger, which should be caught in the hand. The spring may be removed by inserting the long arm of the trigger into the spring and pulling it out.

(5) Disassemble the breech ring from the tube (fig. 28). Remove the nut from the left end of the recoil mechanism coupler key that holds the piston coupler to the breech ring. Pull the key out to the right (fig. 29). With a socket-head set screw wrench, remove the cap screw that locks the breech ring locking key and lift out the breech ring locking key (fig. 30). Draw the tube and sleigh back a few inches to obtain turning clearance for the breech ring and unscrew the ring from the tube (fig. 31).

b. Disassembly. The breech ring was disassembled in process of removal as described in subparagraph a above.

c. Assembly. It is preferable to assemble the breech ring after it has been installed on the tube as described in subparagraph d (2), (3), (4), and (5) below.

ORDNANCE MAINTENANCE — 37-MM ANTITANK GUNS M3 AND M3A1 AND CARRIAGES M4 AND M4A1



RA PD 49945

Figure 31 — Unscrewing the Breech Ring

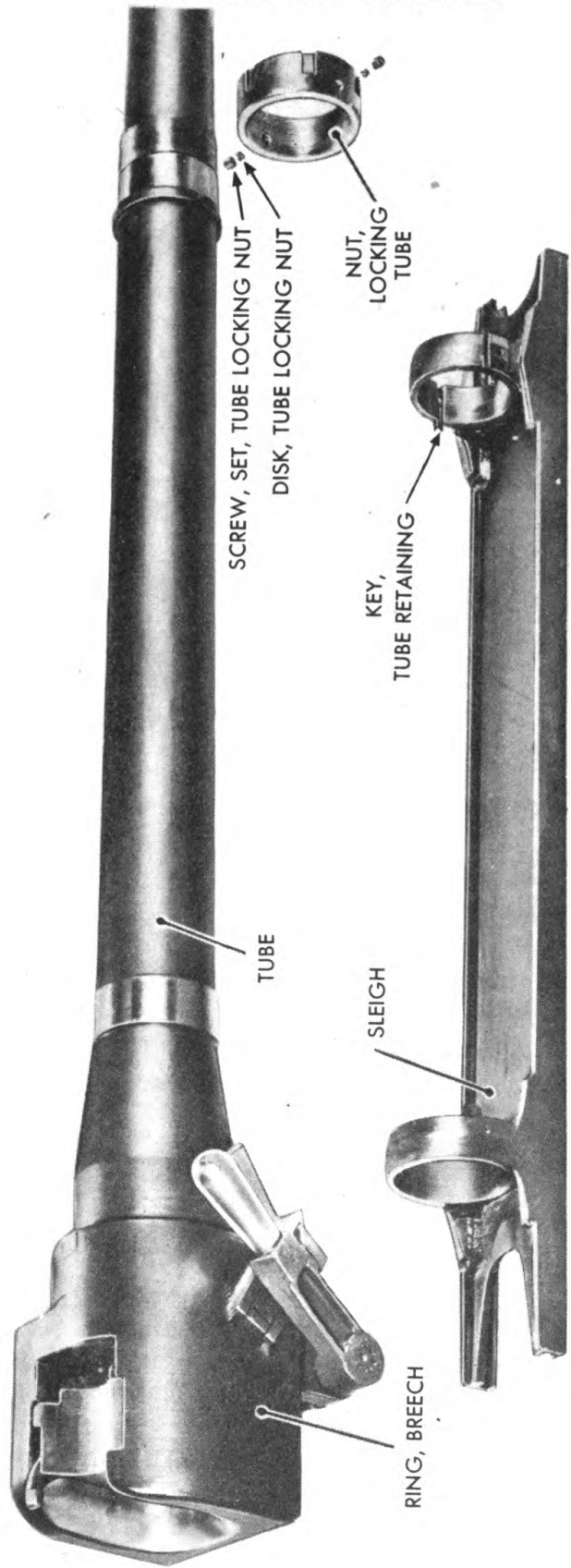
d. Installation.

(1) Hold the breech ring with the top up, slide it onto the tube as far as it will go, and screw it on until the breech faces of the tube and ring are flush and the key seats on their upper sides are alined. Replace the breech ring locking key and the cap screw that holds it in position (fig. 30). Replace the recoil mechanism coupler key in the side of the breech ring and piston coupler.

(2) Insert the trigger plunger compression spring and the trigger plunger into the hole in the rear face of the trigger notch on the lower left side of the breech ring. Press the plunger into the hole with the nail of the left forefinger and with the right hand slide the trigger into the hole at the top of the notch until the shoulder of the trigger contacts the cheek of the ring (fig. 30). Release the plunger.

(3) From inside the breech recess, insert the shaft of the sear tripper into the hub of the trigger with the short arm of the tripper vertical (fig. 26). Slide the tripper in until the flattened end enters the slot in the trigger and the lever of the tripper bottoms in its recess inside the breech ring.

DISASSEMBLY AND ASSEMBLY



RA PD 81543

Figure 32 — Tube and Sleigh

ORDNANCE MAINTENANCE — 37-MM ANTITANK GUNS M3 AND M3A1
AND CARRIAGES M4 AND M4A1

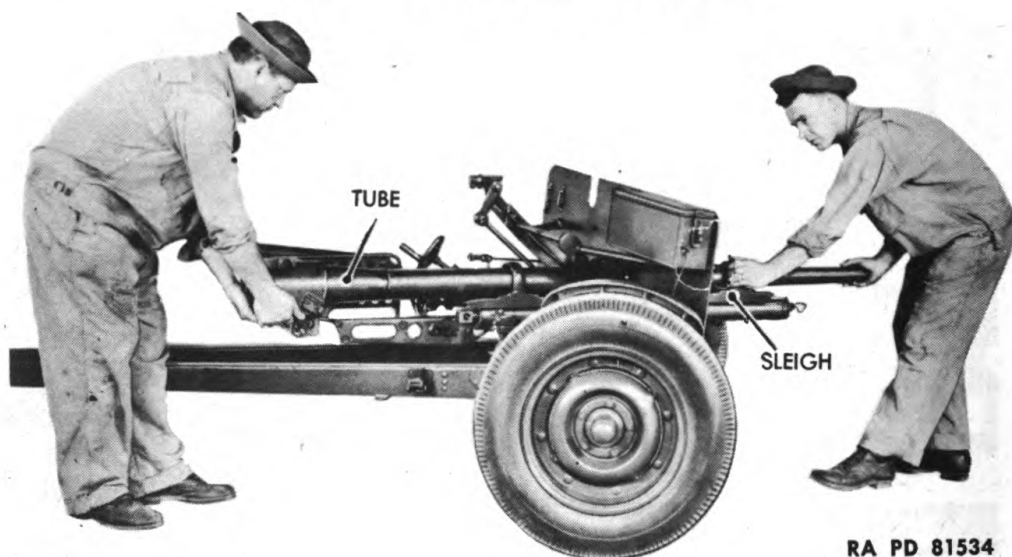


Figure 36 — Removing the Tube

CAUTION: Use extreme care in moving the tube through the yokes to prevent damage to the threads.

b. **Disassembly.** Remove the breech ring (par. 8 a).

c. **Assembly.** Install the breech ring (par. 8 d).

d. **Installation.**

(1) Place the two tube retaining keys in position in the front yoke of the sleigh. Push the tube through the yokes of the sleigh, turning the tube so that the tube retaining keys fit into their slots in the tube (fig. 36). Place the two tube locking nut disks in position in the tube locking nut. Slide the nut over the tube and tighten with a spanner wrench (fig. 34).

CAUTION: If the tube locking nut is tightened without the tube locking nut disks being in place, the threads on the tube may be stripped by the set screws.

(2) Lock the tube locking nut with the two tube locking nut set screws (fig. 33). Replace the recoil mechanism coupler key in the right side of the breech ring (fig. 29) and the nut that secures it.

10. SLEIGH.

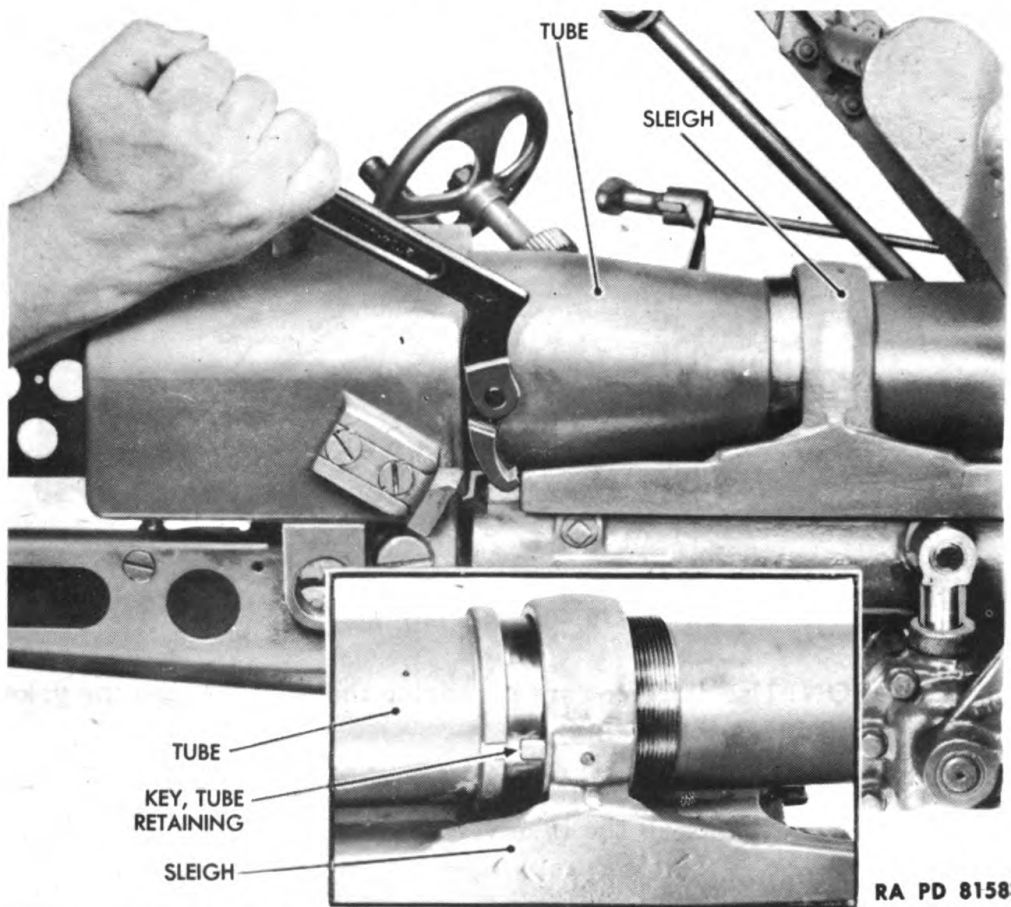
a. **Removal** (fig. 32).

(1) Remove the tube (par. 9 a).

(2) Slide the sleigh off the slides of the recoil cylinder and remove it by grasping both yokes, using extreme care not to damage the brass slides (fig. 37).

NOTE: The tube and sleigh can also be removed together from the recoil mechanism in one operation, but this is not good practice. The

DISASSEMBLY AND ASSEMBLY



RA PD 81583

Figure 35 — Disengaging the Tube Retaining Keys

(4) To assemble the extractors, slide them into their pivots inside the lower front corners of the breech recess, long arms upward and lips projecting toward the chamber (fig. 25).

(5) Install the breechblock (par. 7 c).

9. TUBE.

a. Removal (fig. 32).

(1) Remove the two tube locking nut set screws from the tube locking nut with a $\frac{3}{16}$ -inch socket-head set screw wrench (fig. 33). Remove the nut with a spanner wrench and slide it off the tube (fig. 34).

CAUTION: Be careful not to lose the tube locking nut disks.

(2) Disengage the tube retaining keys from the front yoke of the sleigh by prying the sleigh forward about 1 inch (fig. 35). Remove the nut from the left end of the recoil mechanism coupler key and pull the key out from the right (fig. 29). With the trails closed and the gun fully traversed in either directions, slide the tube to the rear through the yokes of the sleigh, holding the sleigh to prevent it from sliding back with the tube (fig. 36).

ORDNANCE MAINTENANCE — 37-MM ANTITANK GUNS M3 AND M3A1
AND CARRIAGES M4 AND M4A1

- A—WIRE
- B—SCREW, CAP
- C—CAP, TRUNNION
- D—TRUNNION, RIGHT
- E—TRUNNION, LEFT
- F—MOUNT, TELESCOPE, M19
- G—WASHER
- H—WASHER
- I—NUT, JAM
- J—CYLINDER, RECOIL
- K—CARRIAGE, TOP

NOTE: Items "F" and "G" are stored and reviewed in SNL F-184.

RA PD 81557

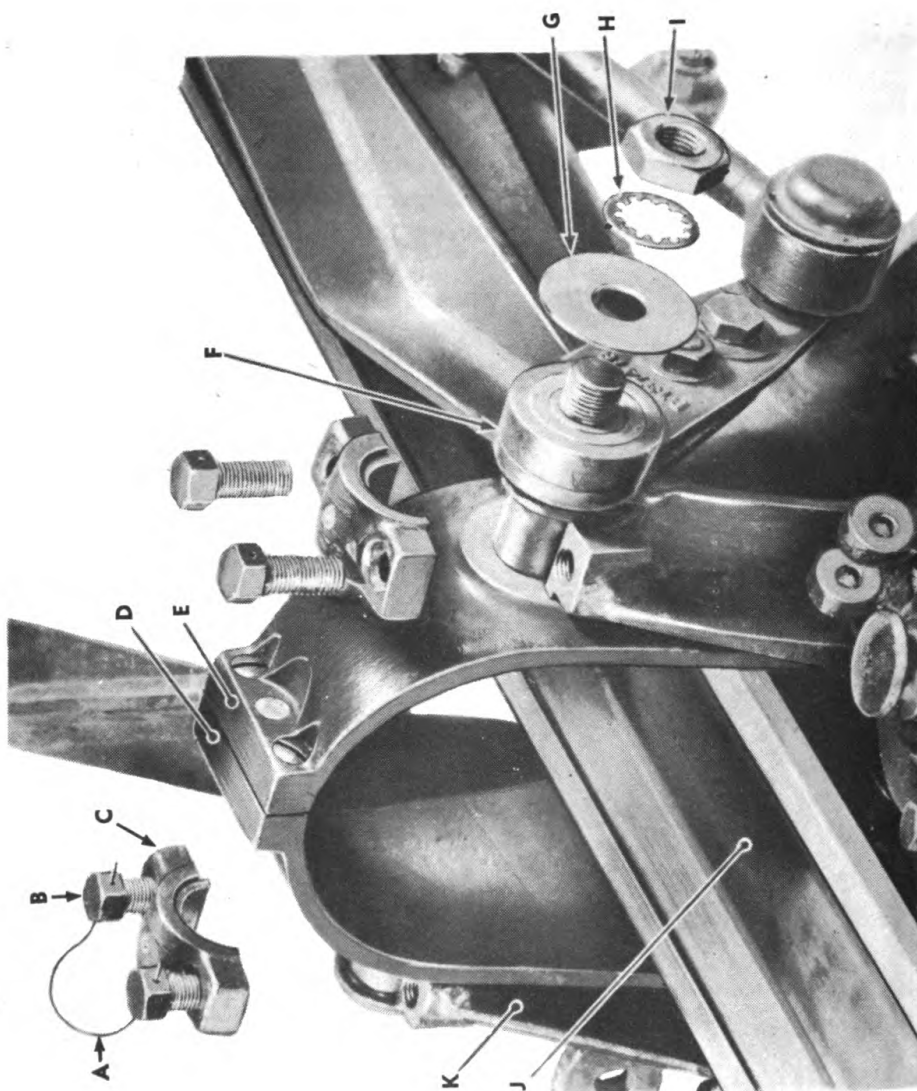


Figure 39 — Trunnion Connection Group Parts

DISASSEMBLY AND ASSEMBLY

tolerance on the rails and railways is small, and if the weight of the tube is allowed to fall just before the sleigh is fully disengaged, the rails can easily be damaged. This would render the whole mechanism unserviceable.

b. Installation.

(1) Slide the sleigh forward on the slides of the recoil cylinder (fig. 37).

(2) Install the tube (par. 9 d).

11. TELESCOPE MOUNT M19.

a. **Removal.** Remove the four hexagonal nuts holding the upper part or bracket of the telescope mount to the top carriage arms (fig. 38). Unscrew the large hexagonal jam nut that connects the lower end or arm of the telescope mount to the threaded extension of the left trunnion and remove the two washers (fig. 39). Then slide the mount off the trunnion and gently tap the upper portion of the telescope mount from the top carriage arm, being careful not to damage the straight pins.

b. **Disassembly and Assembly.** See TM 9-1578.

c. **Installation.** Slide the telescope mount arm onto the extension of the left trunnion. Then place the upper part or bracket of the telescope mount in place on the top carriage arm and install two pins and the four hexagonal nuts. Place the two washers and hexagonal nut on the extension of the left trunnion and tighten the nut. Check to make sure that the telescope mount operates freely (FM 23-70, par. 28).

12. SHOULDER GUARD SUPPORT, SHOULDER GUARD, AND SHOULDER GUARD GUIDE.

a. Removal.

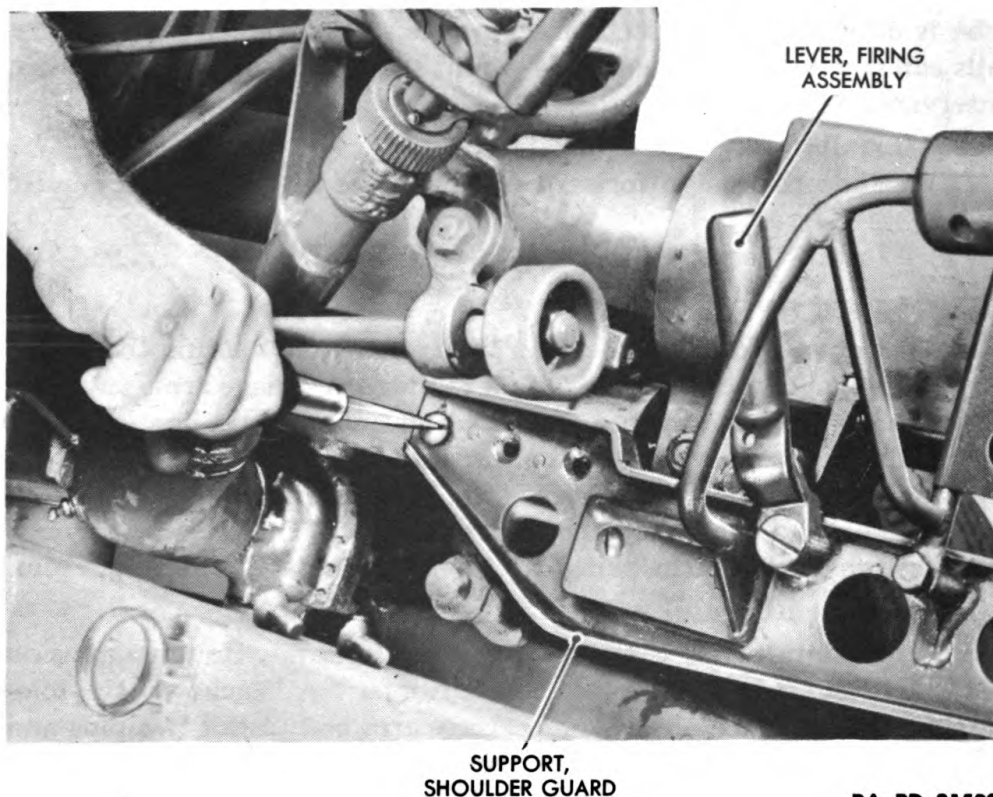
(1) **CARRIAGE M4A1.** Unscrew the three shoulder guard support screws securing the support to the rear of the recoil cylinder (fig. 40). The shoulder guard support, shoulder guard, shoulder guard guide, and firing lever assembly will then come away. Be careful not to damage the two straight pins in removing the support.

(2) **CARRIAGE M4.** Remove the set screw from the top of the shoulder guard support (fig. 41). This screw locks the firing mechanism lever pin in place. Remove the firing mechanism lever pin. Remove the oval screws from fittings housing. The housing, firing mechanism lever, and firing mechanism parts will then come away from the shoulder guard support. Be careful not to damage the two straight pins while removing the housing. Unscrew the three shoulder guard support screws securing the support to the rear of the recoil cylinder (fig. 40). The shoulder guard support and shoulder guard will then come away. The two straight pins will come away at the same time.

b. Disassembly.

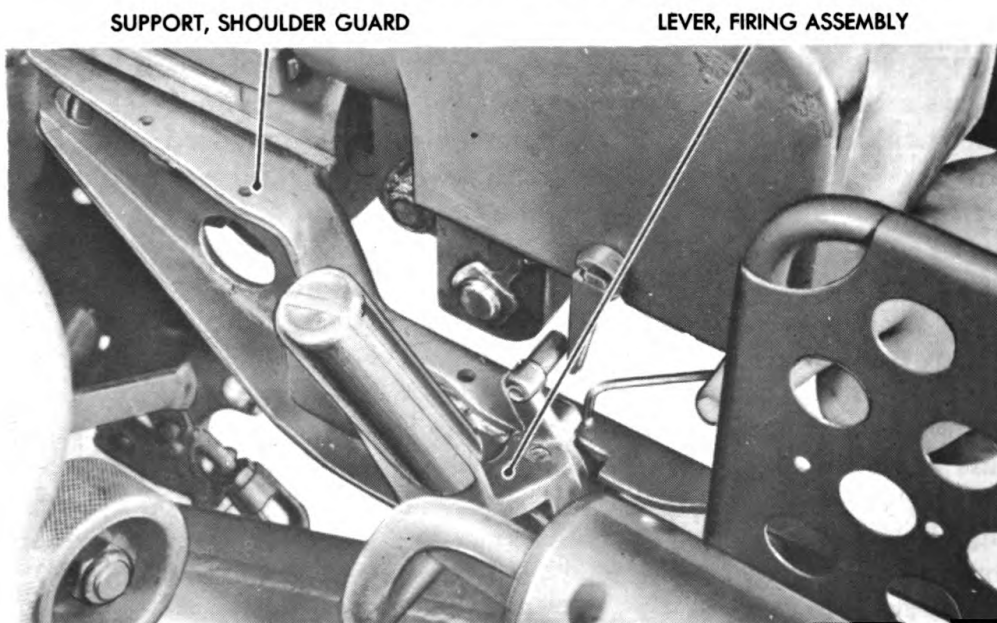
(1) **CARRIAGE M4A1.** Remove the nuts and washers from the two machine screws holding the shoulder guard support to the shoulder

**ORDNANCE MAINTENANCE — 37-MM ANTITANK GUNS M3 AND M3A1
AND CARRIAGES M4 AND M4A1**



RA PD 81532

Figure 40 — Removing the Shoulder Guard Support, Shoulder Guard, and Shoulder Guard Guide



RA PD 81518

Figure 41 — Removing the Set Screw from Firing Lever Assembly

DISASSEMBLY AND ASSEMBLY

guard guide. Remove the nuts and washers from the three machine screws holding the guard to the support. Remove the shoulder guard guide by unscrewing the eight screws holding its two parts together. Remove the set screw from the top of the shoulder guard support (fig. 41). Unscrew the screw that holds the firing lever to the shoulder guard support and remove the lever.

(2) **CARRIAGE M4.** Remove the nuts and washers from the three machine screws holding the shoulder guard support to the shoulder guard.

c. Assembly.

(1) **CARRIAGE M4A1.** Replace the two parts of the shoulder guard guide with the eight screws. Attach the shoulder guard and guide to the shoulder guard support with the nuts, washers, and machine screws. Replace the firing lever on the shoulder guard and the screw that retains it. Replace the set screw in the top of the support (fig. 41).

(2) **CARRIAGE M4.** Attach the shoulder guard to the shoulder guard support by replacing the nuts, washers, and machine screws.

d. Installation.

(1) **CARRIAGE M4A1.** Place the shoulder guard support, shoulder guard, and shoulder guard guide in position on the recoil cylinder and secure them with the three shoulder guard support screws and two straight pins (fig. 40).

(2) **CARRIAGE M4.** Place the shoulder guard support and shoulder guard in position on the recoil cylinder and secure them with the three shoulder guard support screws and two straight pins (fig. 40). Put the cable and fittings housing, the firing mechanism lever, and the allied firing mechanism parts in position on the shoulder guard support. Secure the cable and fittings housing with the oval screws and straight pins. Secure the firing mechanism lever with the firing mechanism lever pin and replace its set screw in the top of the shoulder guard support (fig. 41).

13. RECOIL MECHANISM.

a. Removal.

- (1) Remove the tube (par. 9 a).
- (2) Remove the sleigh (par. 10 a).
- (3) Remove the shoulder guard support, shoulder guard, and shoulder guard guide (par. 12 a).
- (4) Remove the elevating gear case (par. 16 a (4)).
- (5) Remove the safety wire on the trunnion cap screws and remove the screws (fig. 39). Lift off the trunnion caps (fig. 42). Unscrew the jam nut, and remove the nut, lock washer, and washer from the extension on the left trunnion. Remove the telescope mount from the exten-

**ORDNANCE MAINTENANCE — 37-MM ANTITANK GUNS M3 AND M3A1
AND CARRIAGES M4 AND M4A1**

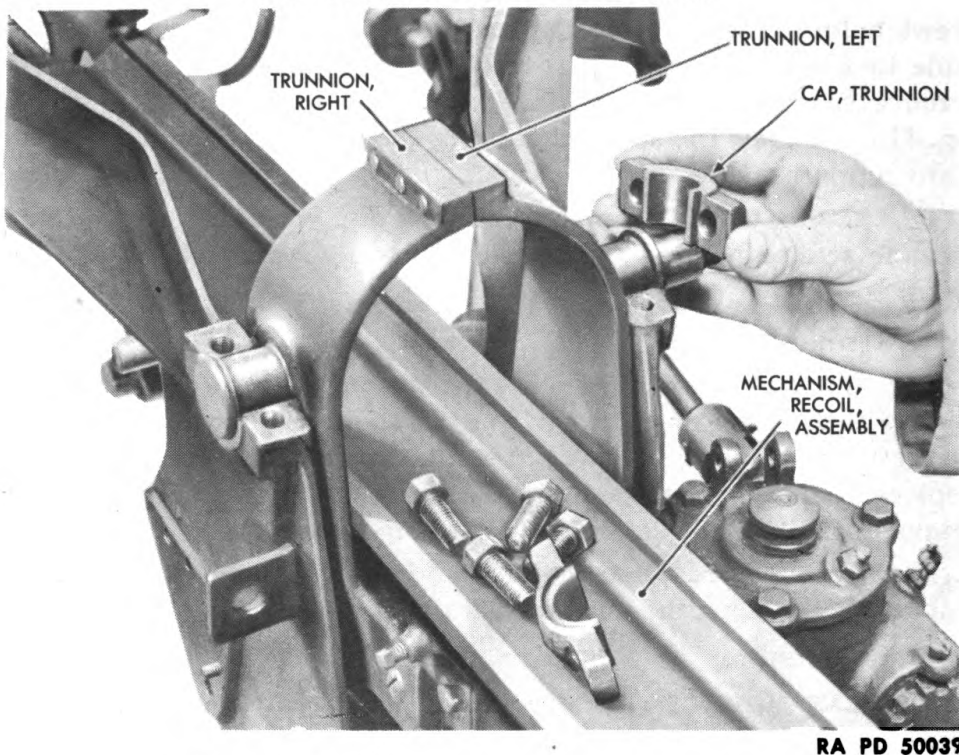


Figure 42 — Removing the Trunnion Caps

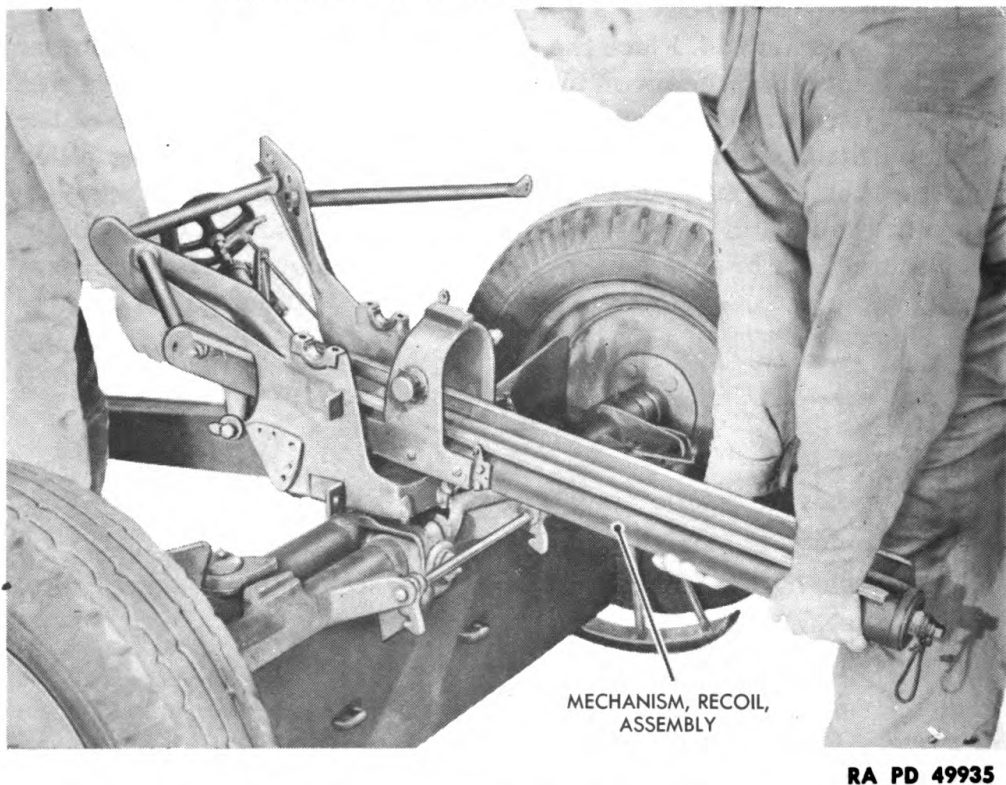


Figure 43 — Removing the Recoil Cylinder

DISASSEMBLY AND ASSEMBLY

RA PD 81540

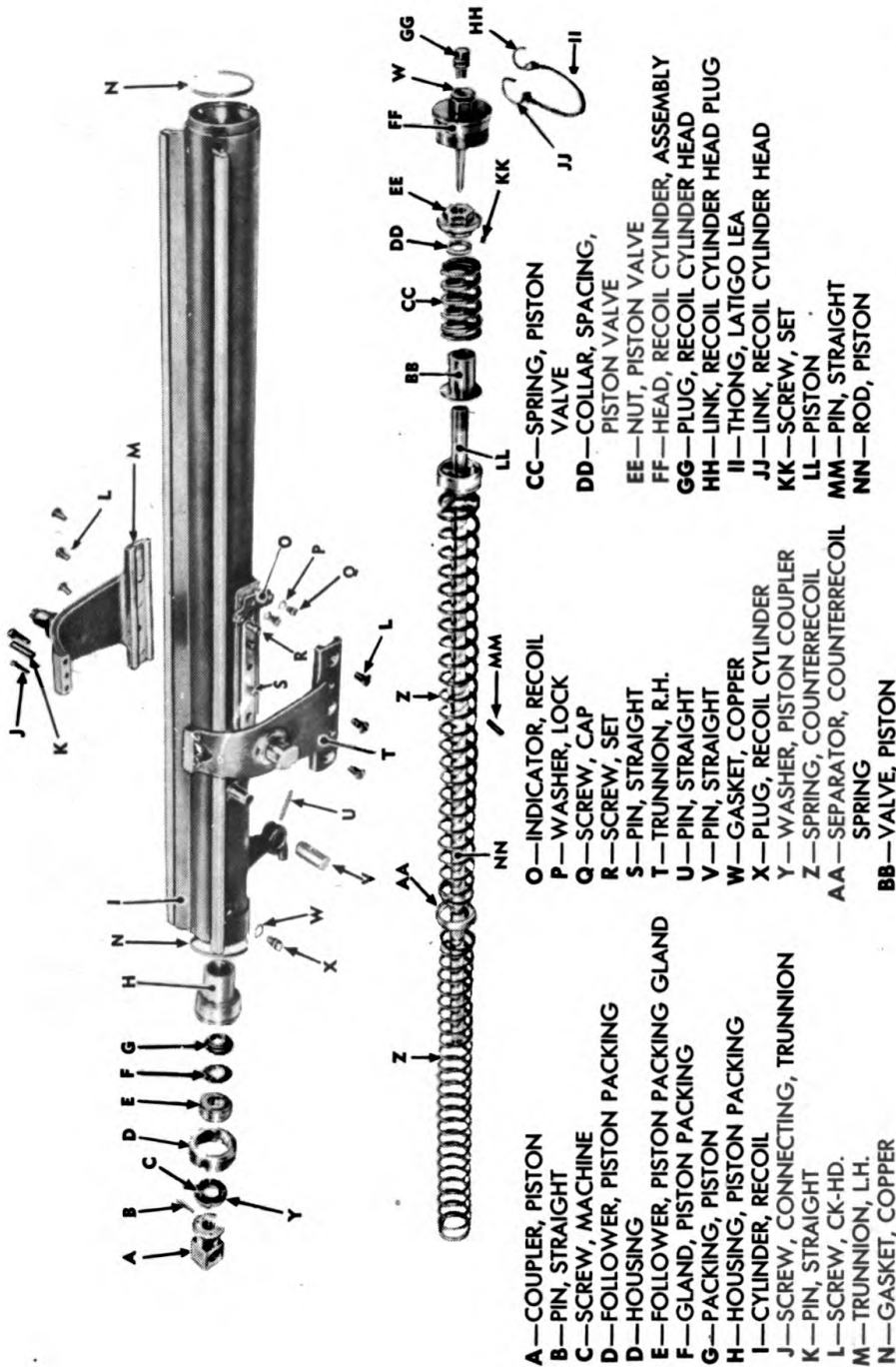


Figure 44 — Recoil Mechanism — Exploded View

ORDNANCE MAINTENANCE — 37-MM ANTITANK GUNS M3 AND M3A1 AND CARRIAGES M4 AND M4A1

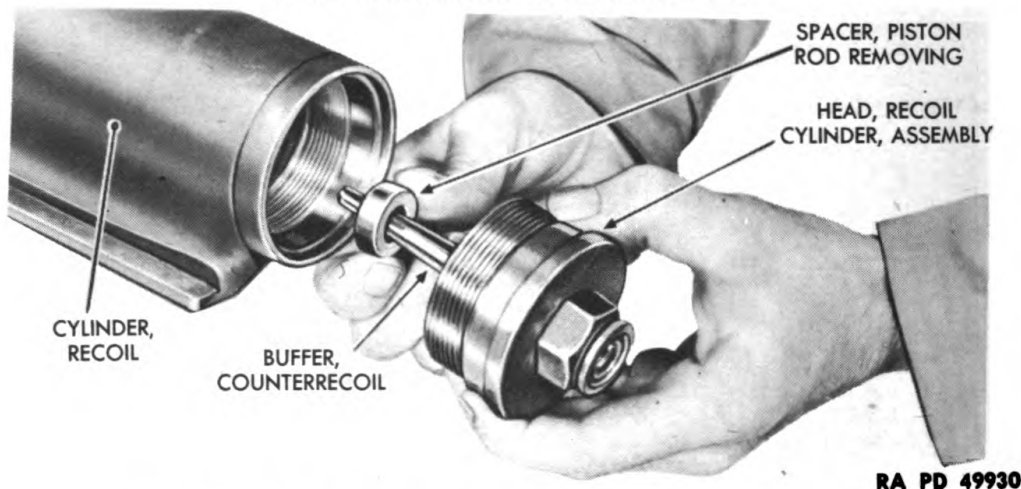


Figure 45 — Inserting the Piston Rod Removing Spacer and Recoil Cylinder Head Assembly

sion on the trunnion. Lift off the recoil cylinder and carry it back, tipping it clockwise to get it through the arms of the top carriage (fig. 43).

h. Disassembly (fig. 44).

NOTE: The recoil mechanism may be disassembled while on or off the carriage, provided the tube and sleigh are removed. It is not necessary to remove the shield as shown in the following illustrations except for convenience.

(1) Drain all oil from the recoil cylinder as follows: Depress the gun 1 or 2 degrees, and remove the recoil cylinder rear plug. With a receptacle placed to catch the drained oil, elevate the gun to maximum elevation. Remove the recoil cylinder head plug to vent the cylinder. Drain all the oil possible from the recoil cylinder and then elevate the gun to a level position.

(2) Remove the recoil cylinder head. Place the piston rod removing spacer on the counterrecoil buffer of the recoil cylinder head assembly and replace the recoil cylinder head assembly (fig. 45). This will force the piston rod and piston coupler sufficiently to the rear to allow removal of the straight pin from the end of the coupler (fig. 46). Unscrew the piston coupler from the piston rod (fig. 47).

NOTE: If the piston turns while attempting to remove the piston coupler, remove the recoil cylinder head assembly and hold the piston valve nut with a wrench until the coupler is loosened. Replace the cylinder head assembly and remove the coupler.

(3) Remove the machine screw from the piston coupler washer and remove the washer.

(4) Attach the piston rod puller to the piston rod making sure the eye of the puller is vertical (fig. 48). Place the pulling bar through the

DISASSEMBLY AND ASSEMBLY

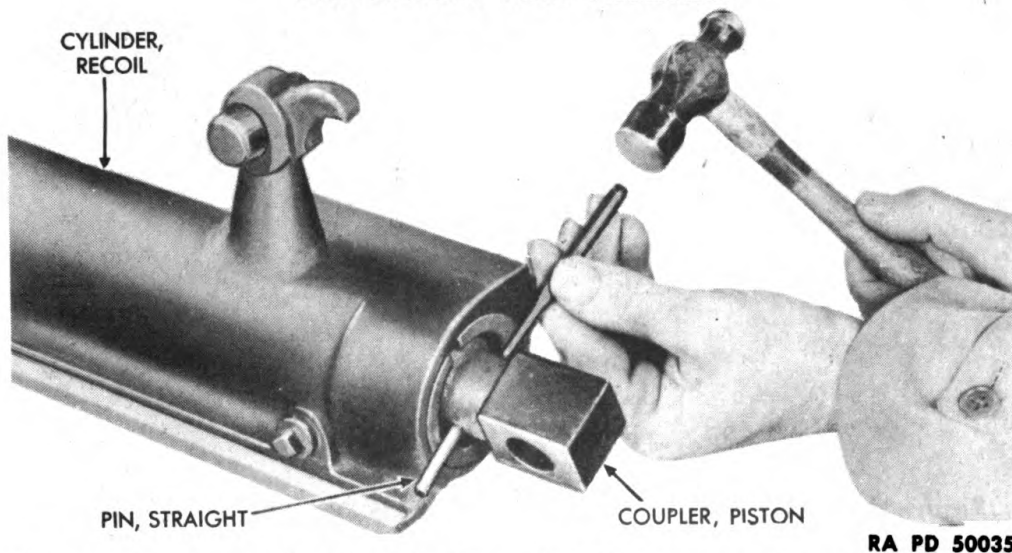


Figure 46 — Removing the Pin from the Piston Coupler and Piston Rod

eye of the piston rod puller and, with a man pulling on each end of the bar, keep the counterrecoil springs under compression and remove the recoil cylinder head assembly and piston rod removing spacer (fig. 49).

CAUTION: Be sure only a straight pull is exerted on the piston rod puller; otherwise, it may break so releasing the springs and causing serious personal injury.

(5) Gradually release the pressure or pull on the counterrecoil springs. With the spring pressure released, remove the pulling bar from the piston rod puller and unscrew the eye from the puller. Then remove as a unit: the piston, piston rod, counterrecoil springs, counterrecoil spring separator, and piston valve assembly from the front end of the recoil cylinder (fig. 50). Remove the end of the puller attached to the piston rod, being careful not to damage the sides of the cylinder.

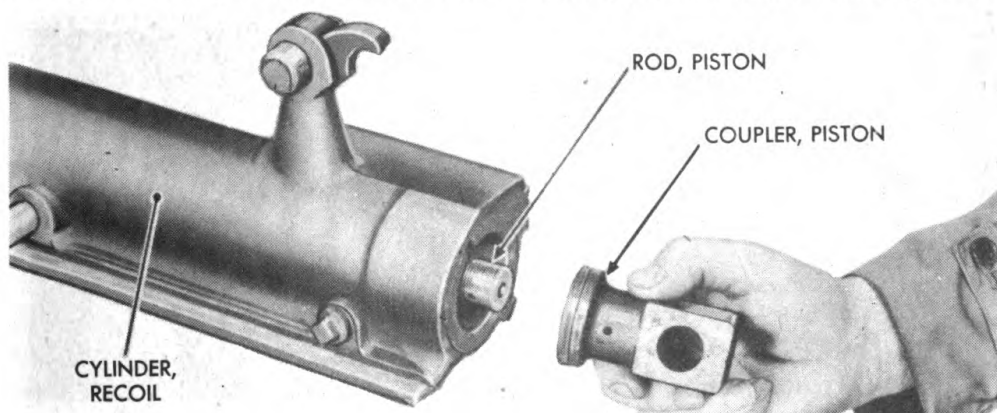
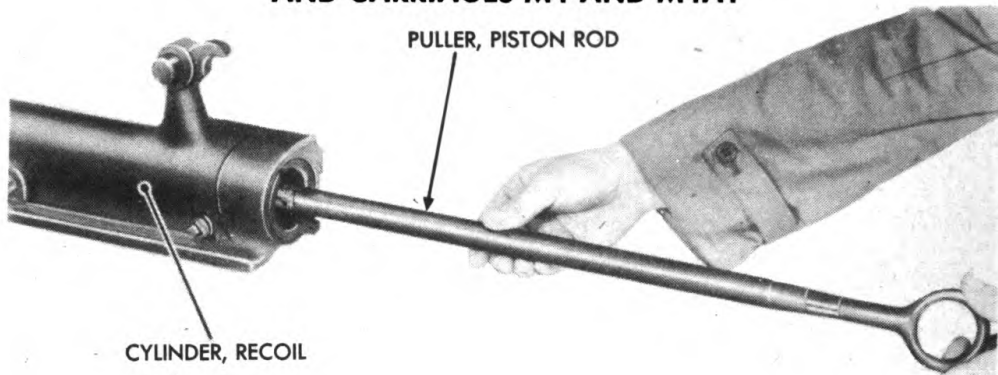


Figure 47 — Removing the Piston Coupler from the Piston Rod

ORDNANCE MAINTENANCE — 37-MM ANTITANK GUNS M3 AND M3A1
AND CARRIAGES M4 AND M4A1

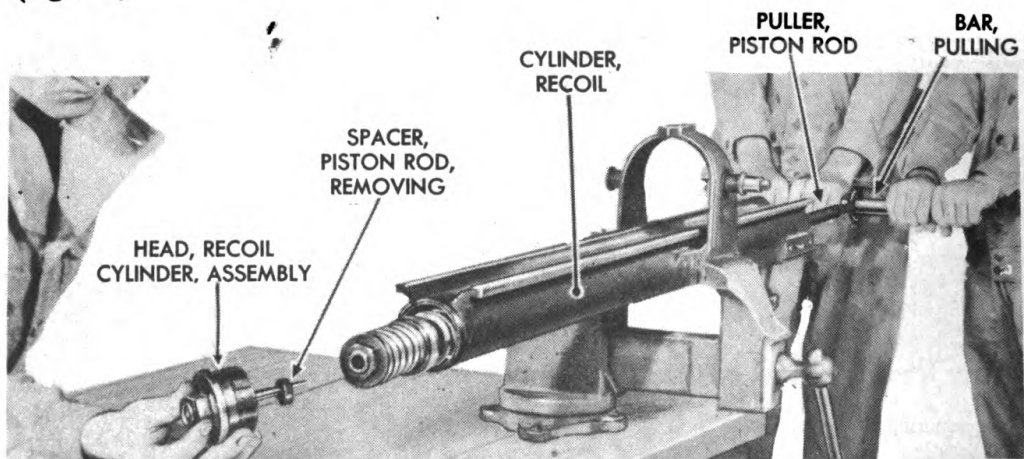


RA PD 49969

Figure 48 — Screwing the Piston Rod Puller Onto the Piston Rod

(6) To disassemble the piston valve assembly on the front of the piston rod, first remove the set screw from the piston valve nut (fig. 51). Unscrew and remove the piston valve nut and remove the piston valve spring (fig. 52). Remove the piston valve spacing collar and the piston valve (fig. 53).

(7) Unscrew and remove the piston packing housing follower from the rear end of the recoil cylinder (fig. 54). Use the combination tool in this operation. Remove as a unit: the piston packing housing, piston packing gland follower, piston packing gland, and piston packing from the recoil cylinder (fig. 55). With the piston packing housing in a copper jawed vise, place the four pins on the raised knob of the combination tool in the four holes in the piston packing gland follower and remove the piston packing gland follower (fig. 56). Remove the piston packing gland and the piston packing from the piston packing housing (fig. 57).



RA PD 50018

Figure 49 — Removing the Recoil Cylinder Head Assembly and Piston Rod Removing Spacer

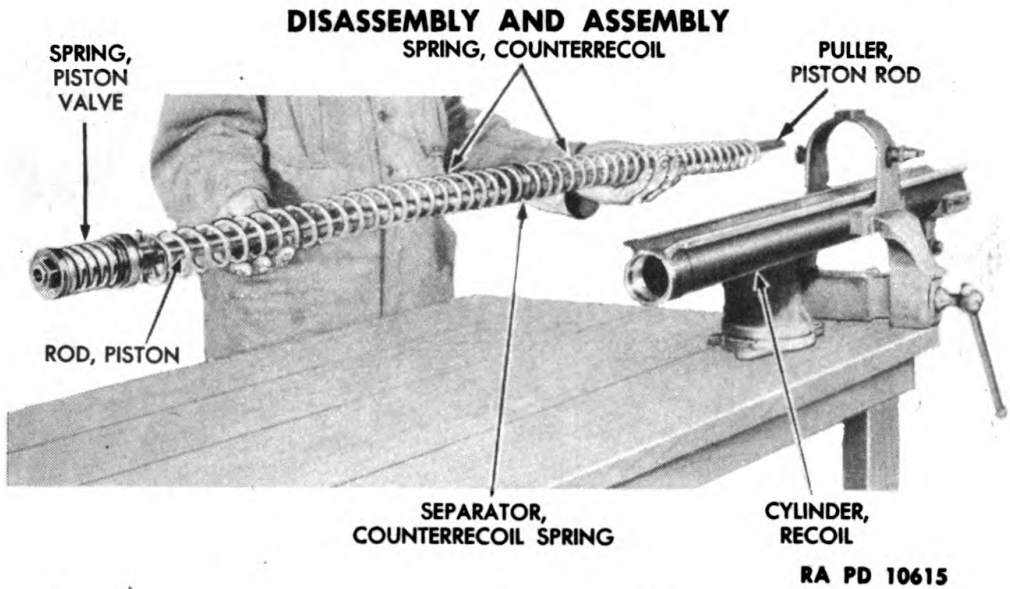


Figure 50 — Removing the Counterrecoil Springs and Allied Parts

NOTE: Care must be taken during the above operations to prevent injury to the piston packing. Be sure that a soft brass or copper facing is placed over the vise jaws during the operations.

c. Assembly.

(1) Put the piston packing housing in a vise with copper jaws. Place the piston packing and piston packing gland in position in the piston packing housing (fig. 57). With the combination tool, screw the piston packing gland follower into the housing (fig. 56). Place the piston packing housing into the rear of the recoil cylinder and press it as far forward as it will go (fig. 55). Screw the piston packing housing follower into the recoil cylinder (fig. 54). Use the spanner wrench on the combination tool to tighten it.

(2) To assemble the piston valve assembly, place the piston valve on the piston rod. Replace the piston valve spacing collar (fig. 53). Place the piston valve spring in position and screw the piston valve

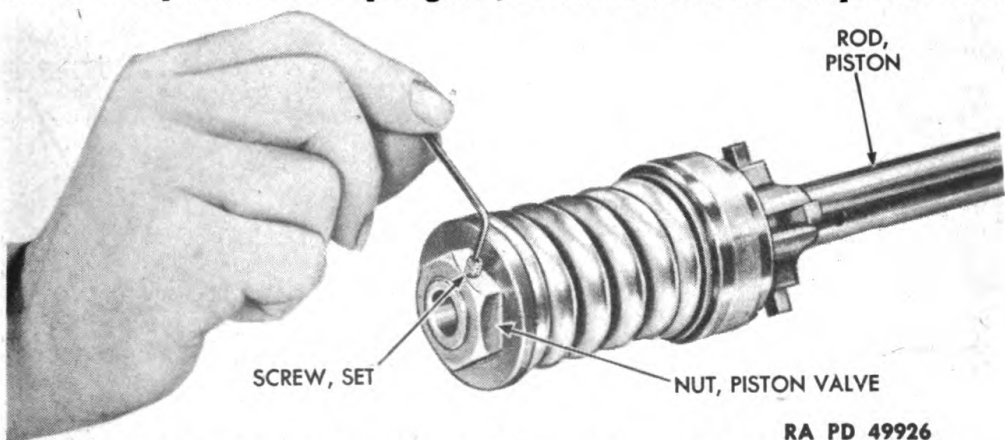
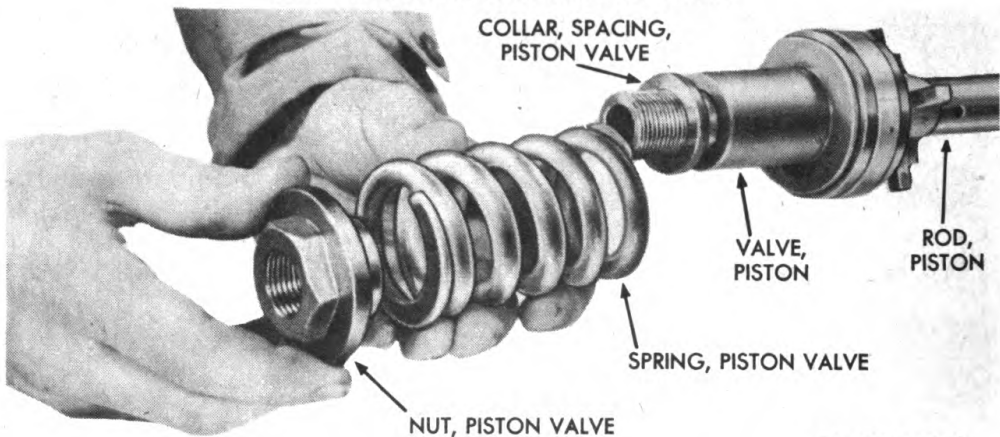


Figure 51 — Removing the Set Screw from the Piston Valve Nut

**ORDNANCE MAINTENANCE — 37-MM ANTITANK GUNS M3 AND M3A1
AND CARRIAGES M4 AND M4A1**



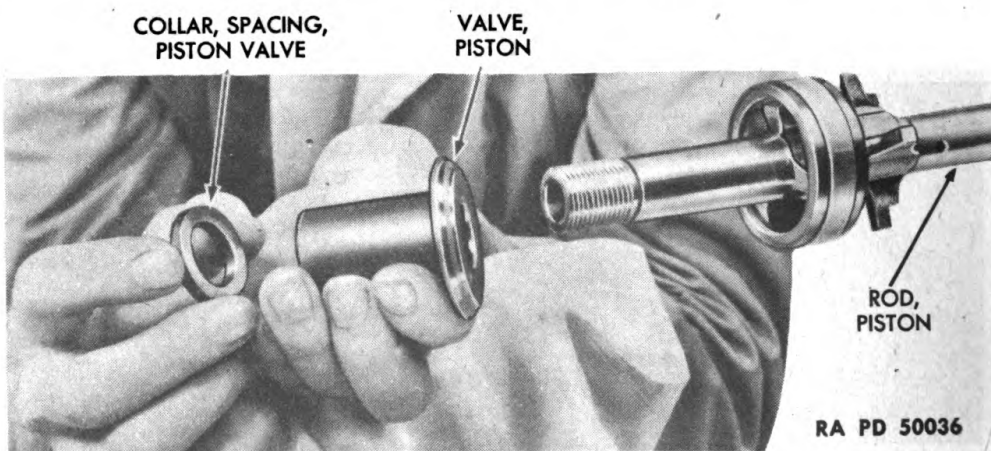
RA PD 50026

Figure 52 — Removing the Piston Valve Nut and the Piston Valve Spring

nut onto the piston rod (fig. 52) until the set screw hole in the piston valve nut is alined with the set screw recess in the piston rod. Lock with the set screw (fig. 51).

NOTE: Recoil adjustment is made by placing a feeler gage between the piston valve spacing collar and piston valve and tightening or loosening the piston valve nut. The standard setting is 0.053 inch. For every $\frac{1}{4}$ -inch variation in recoil length, tighten the piston valve nut 0.0001 inch if the recoil is too long, or loosen the nut correspondingly if the recoil is too short. Center-punch the piston rod through the set screw hole in the piston valve nut. Drill and countersink a hole in the piston rod for the set screw at the center punch mark. Insert the set screw in the nut.

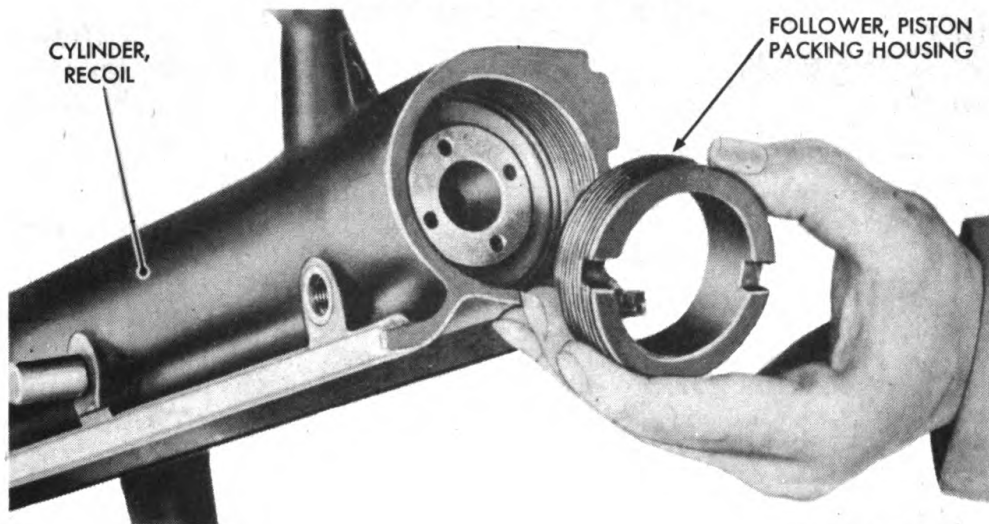
(3) Assemble the counterrecoil springs on the piston rod, making sure the counterrecoil separator is in place between the two



RA PD 50036

Figure 53 — Removing the Piston Valve Spacing Collar and the Piston Valve

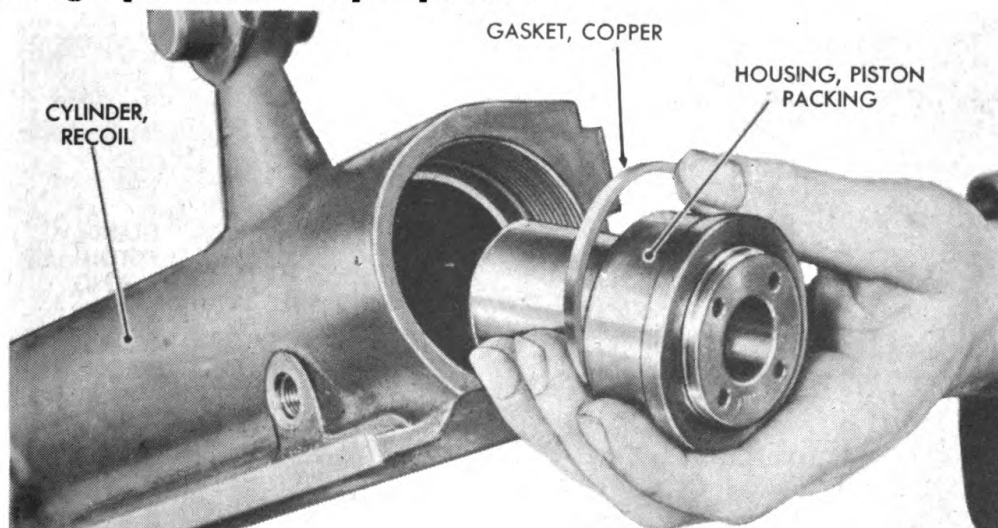
DISASSEMBLY AND ASSEMBLY



RA PD 49981

Figure 54 — Removing the Piston Packing Housing Follower

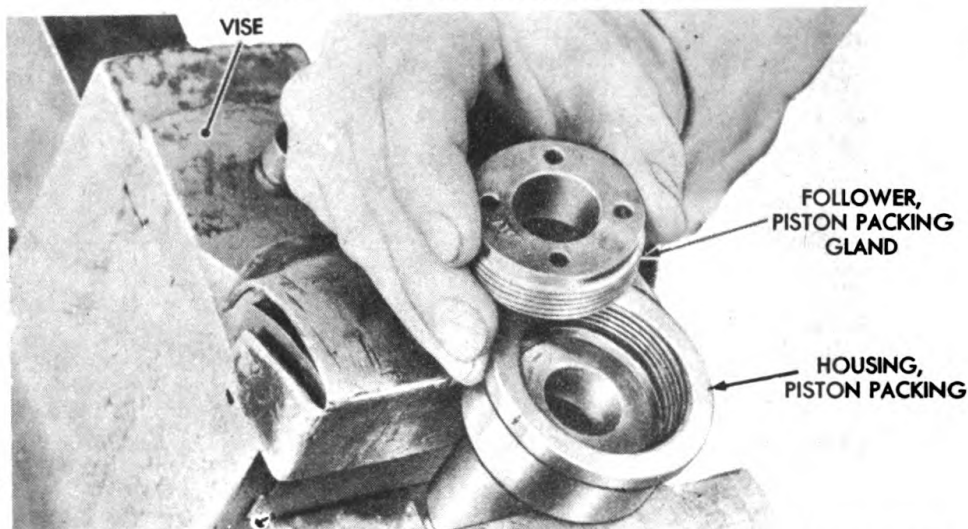
springs (fig. 50). Screw the piston rod puller onto the threaded rear end of the piston rod. Remove the loop from the puller. Insert the piston rod, counterrecoil springs, and allied parts into and through the recoil cylinder using the puller as a guide. Screw the loop on the end of the puller and place the pulling bar through the loop. With two men pulling on the bar, compress the spring. Place the piston rod removing spacer on the counterrecoil buffer of the recoil cylinder head assembly and screw the assembly into the recoil cylinder (fig. 49). Unscrew the piston rod puller from the piston rod (fig. 48). Screw the piston coupler onto the piston rod (fig. 47). Insert the straight pin into the coupler pinhole.



RA PD 49979

Figure 55 — Removing the Piston Packing Housing

ORDNANCE MAINTENANCE — 37-MM ANTITANK GUNS M3 AND M3A1 AND CARRIAGES M4 AND M4A1



RA PD 50049

Figure 56 — Removing the Piston Packing Gland Follower

(4) *Unscrew the recoil cylinder head assembly and remove the piston rod removing spacer from the counterrecoil buffer. Then screw the assembly back into the recoil cylinder.*

(5) *Fill the recoil cylinder with oil, making sure that the proper amount of oil is used (par. 48 e).*

d. Installation.

(1) *Place the recoil mechanism in position on the carriage (fig. 43). Make sure that the trunnions seat evenly in the trunnion bearings. Replace the trunnion caps and tighten the trunnion cap screws*



RA PD 49986

Figure 57 — Removing the Piston Packing Gland and Piston Packing

DISASSEMBLY AND ASSEMBLY

securely (fig. 42). Be sure to safety the screws after they have been tightened. Replace the telescope mount on the extension on the left trunnion and secure it with the lock washer, washer, and jam nut.

- (2) Install the elevating gear case (par. 16 d (1)).
- (3) Install the sleigh (par. 10 b).
- (4) Install the tube (par. 9 d).
- (5) Install the shoulder guard support, shoulder guard, and shoulder guard guide (par. 12 d).

14. SHIELD, APRON LOCKING MECHANISM, APRON, AND GUARDS.

a. Removal.

(1) To remove the shield (fig. 58) first remove the cotter pin and straight pin from the traversing rod end yoke and pull the rod and rod end yoke through the hole in the shield. Remove the washers and nuts that hold the shield braces to the top carriage and the cap screws, washers, and nuts holding the bottom of the shield to the top carriage supporting the shield while removing the last of the screws. Lift off the shield and braces.

(2) Drive out the apron locking hook spring pins and the straight pins from the two brackets on the axle (fig. 59). Remove the apron locking hook springs from the apron locking hooks. Remove the taper pins from the apron locking hooks (fig. 60). These must be driven from the side opposite the hook. The apron locking mechanism shaft can then be pulled out and the apron locking mechanism hooks will come away (fig. 61).

(3) Remove the apron plate (fig. 59) by removing the cotter pin from each of the apron hinge pins and tapping the apron hinge pins from the apron hinges (fig. 62).

(4) Remove the guards by removing the four cap screws and washers holding them to the pintle support (fig. 63).

b. Disassembly (fig. 59).

(1) There is no further disassembly of the apron locking mechanism, apron, or guards.

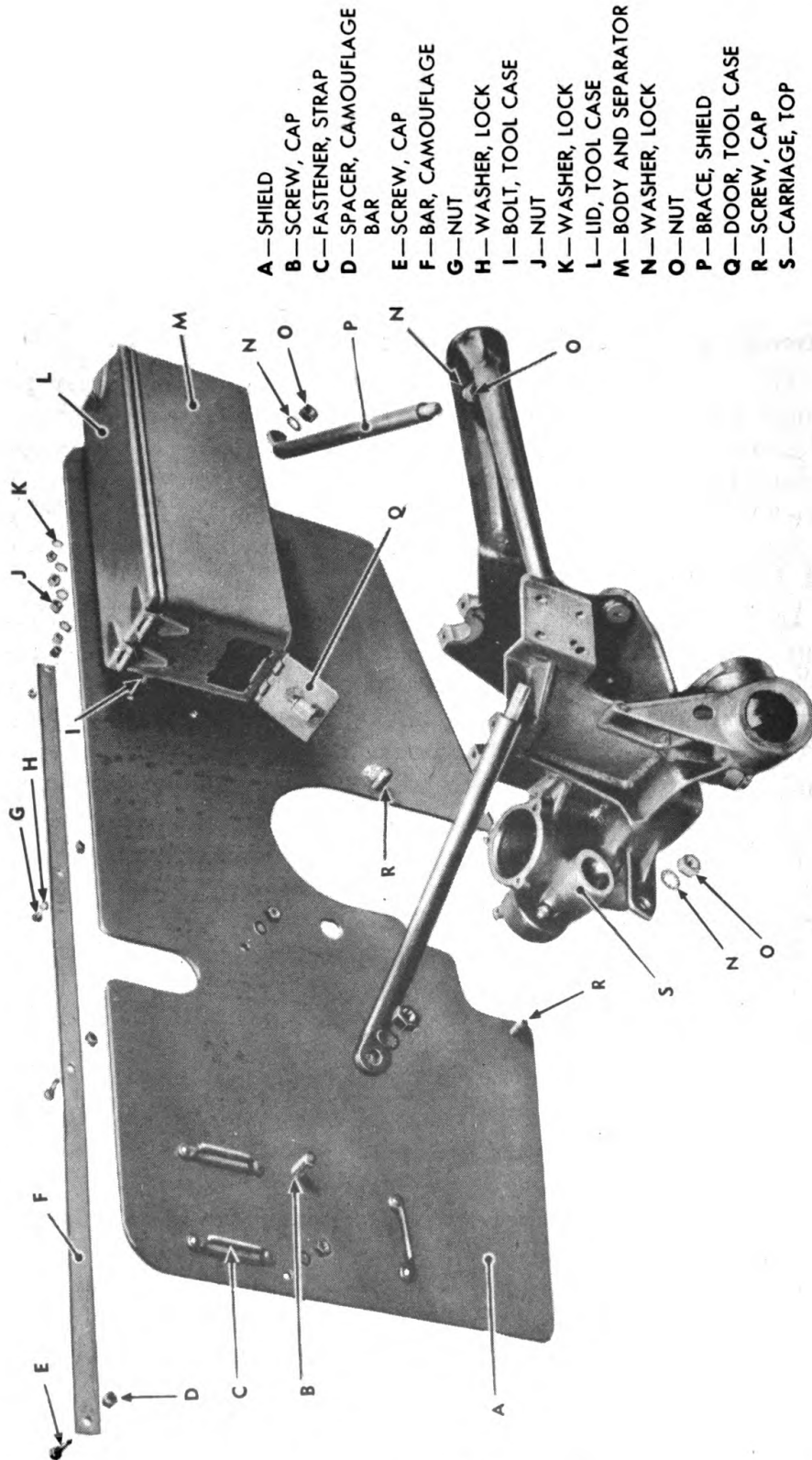
(2) Remove the camouflage bar by removing the cap screws and camouflage bar spacers holding it to the shield.

(3) Remove the shield braces by removing the cap screws, washers, and nuts holding them to the shield.

(4) Remove the tool case assembly by removing the nuts and washers from the four bolts holding it to the shield.

(5) Remove the four screws holding the contact plate in the battery compartment of the tool case (fig. 64). Remove the screws from the switch and remove the wires. Pull out the wire from the front of

ORDNANCE MAINTENANCE — 37-MM ANTITANK GUNS M3 AND M3A1
AND CARRIAGES M4 AND M4A1



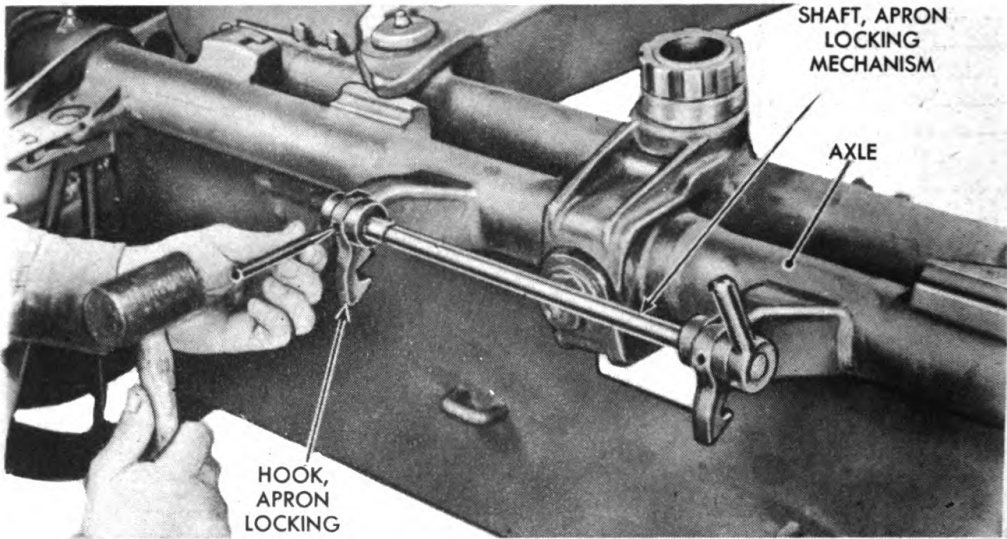
RA PD 81558

Figure 58 — Shield Group Parts

RA PD 81555



ORDNANCE MAINTENANCE — 37-MM ANTITANK GUNS M3 AND M3A1
AND CARRIAGES M4 AND M4A1

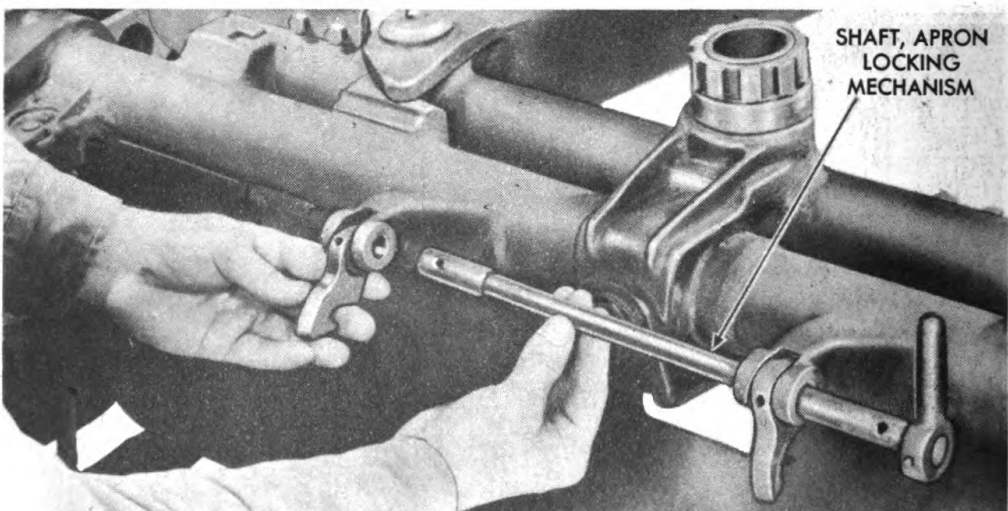


RA PD 81589

Figure 60 — Removing the Taper Pin from the Apron Locking Hook and Apron Locking Mechanism Shaft

the socket and remove the spring from the wire. Remove the tool case tray. Remove the nut from the wire connection and pull out the wire. Remove the nut and washer from the switch and remove the switch and washer from the contact plate.

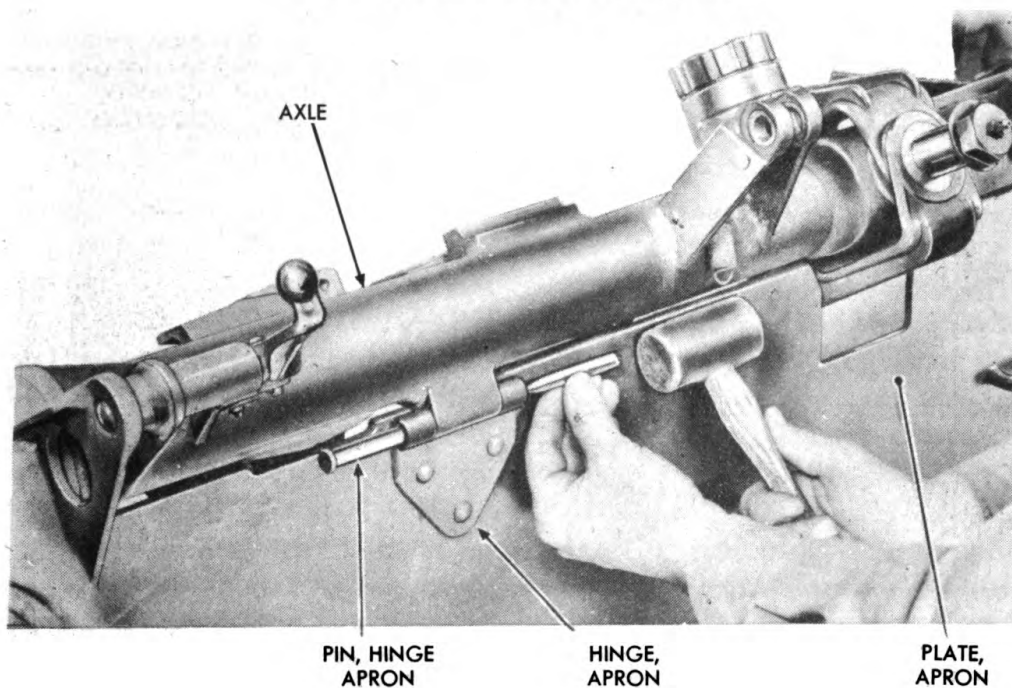
- (6) Remove the cotter pin from the tool case door latch nut and



RA PD 81569

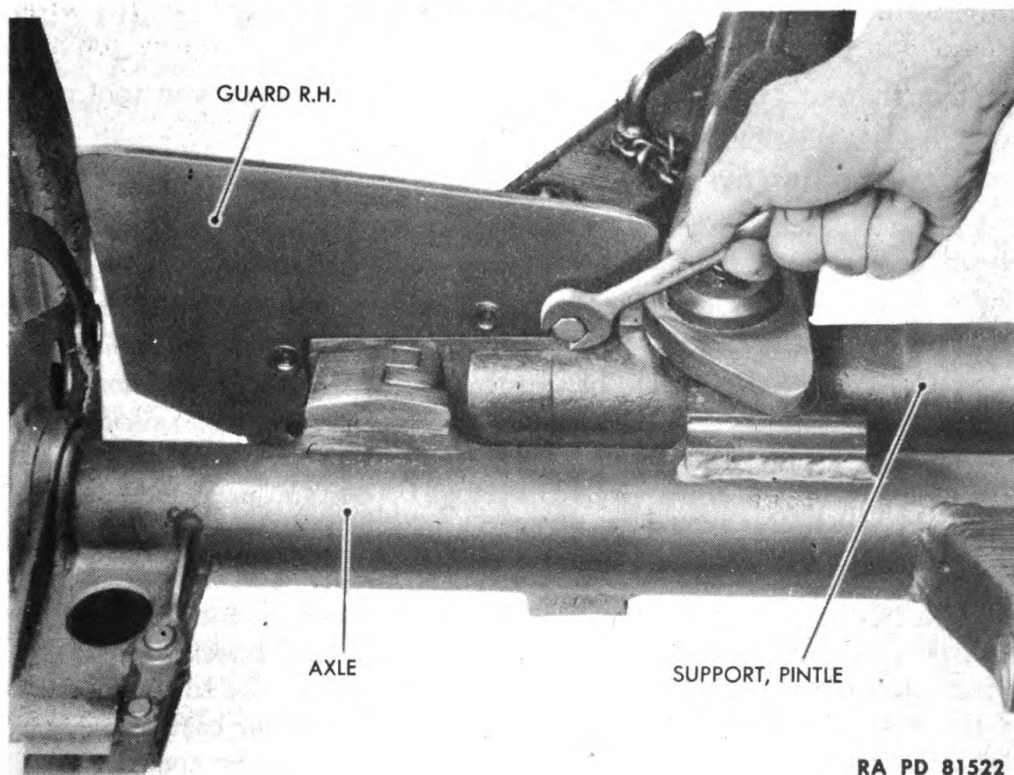
Figure 61 — Removing the Apron Locking Hook and Apron Locking Mechanism Shaft

DISASSEMBLY AND ASSEMBLY



RA PD 49982

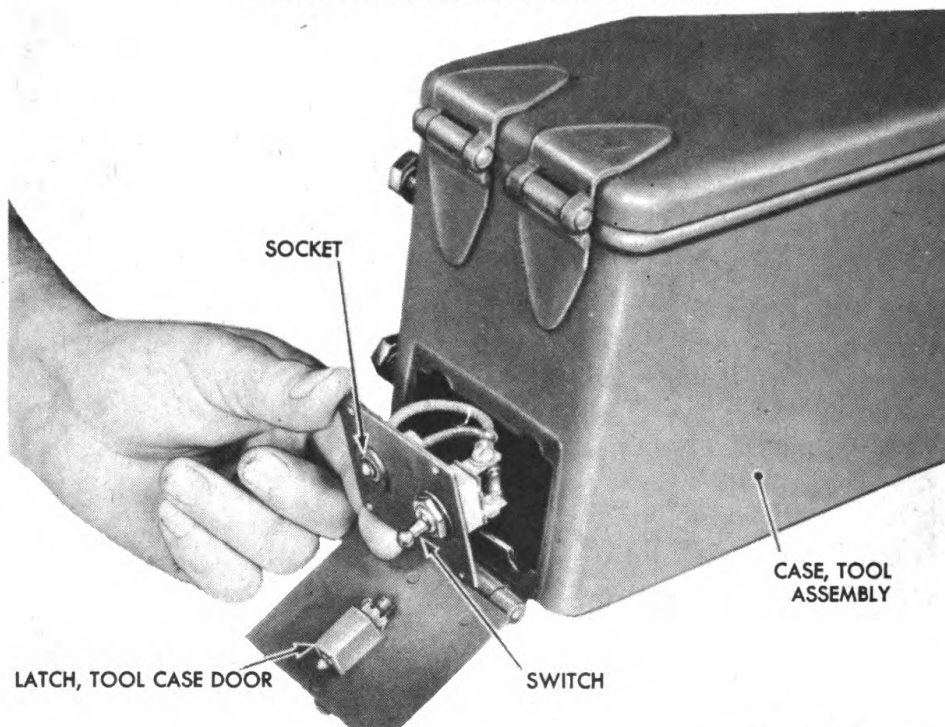
Figure 62 — Removing the Apron Hinge Pin



RA PD 81522

Figure 63 — Removing the Guard

ORDNANCE MAINTENANCE — 37-MM ANTITANK GUNS M3 AND M3A1 AND CARRIAGES M4 AND M4A1



RA PD 81581

Figure 64 — Removing the Contact Plate

remove the nut (fig. 64). The tool case door latch pin and tool case door latch spring will then come away.

c. Assembly (fig. 59).

(1) No assembly previous to installation is required on the guards, apron, or apron locking mechanism.

(2) Install the camouflage bar and the camouflage bar spacers and cap screws holding it to the shield.

(3) Assemble the shield braces to the shield with the washers, cap screws, and nuts.

(4) Install the tool case assembly with its four nuts, washers, and bolts.

(5) Replace the rear washer on the switch and replace the switch on the contact plate. Replace the washer on the front of the switch and screw on the nut. Replace the spring on the socket wire and insert the wire through the socket from the front. Attach the socket wire to the top of the switch with the screw. Attach the battery wire to the bottom of the switch, push it through the bottom of the tool case tray, and fasten it to the wire connection with the nut. Replace the contact plate with the four screws holding it (fig. 64).

(6) Place the tool case door latch spring on the tool case door

DISASSEMBLY AND ASSEMBLY

latch pin. Insert the pin and spring into the tool case door latch housing. Replace the tool case door latch nut and cotter pin (fig. 64).

d. Installation (fig. 59).

(1) Assemble the guards to the pintle support with the four cap screws and shakeproof lock washers (fig. 63).

(2) Assemble the apron plate to the brackets on the lower side of the axle with the apron hinge pins and cotter pins (fig. 62).

(3) Assemble the two apron locking hook springs to the brackets on the axle with the apron locking hook spring pins. Assemble the apron locking mechanism shaft through the brackets with the apron locking hooks in place (fig. 61). Secure the apron locking hooks to the shaft with the taper pins (fig. 60). Connect the apron locking hook springs to the apron locking hooks with the straight pins (fig. 59).

(4) Assemble the bottom of the shield to the top carriage with cap screws, shakeproof lock washers, and nuts (fig. 58). Assemble the shield braces to the top carriage with shakeproof lock washers and hexagonal nuts, and cap screws. Replace the traversing mechanism lever rod and rod end yoke by pushing them through the hole in the shield and inserting the pin and cotter pin through the rod end yoke and traversing mechanism lever.

15. FIRING MECHANISM CONTROLS.

a. **Removal and Disassembly from Carriage M4A1.** Unscrew the set screw from the top of the shoulder guard support. This set screw locks the screw that holds the firing lever to the shoulder guard support (fig. 41). Remove the screw from the firing lever and remove the lever.

b. Removal and Disassembly from Carriage M4 (figs. 65 and 66).

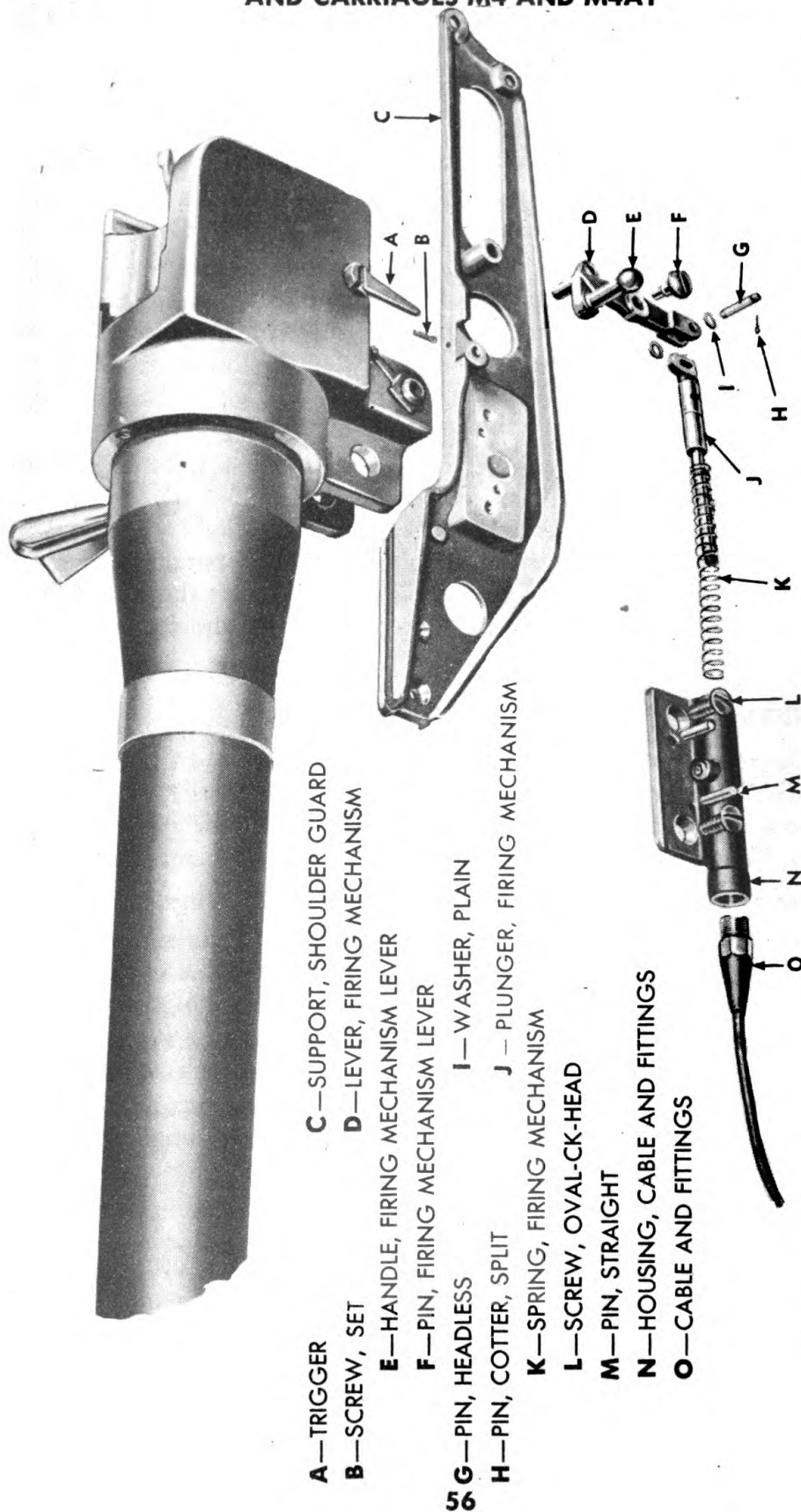
(1) Remove the lower cotter pins from the two headless pins holding the firing control link and remove the headless pins and the link from the elevating and fire controls support (fig. 67).

(2) Remove the straight pin from the under side of the elevating knob. Remove the straight pin from the firing control disk. Tap the elevating knob gently off the long shaft gear removing the firing plunger at the same time (fig. 68). Remove the key from the long shaft gear. Remove the firing control disk and the firing plunger spring.

(3) Unscrew the firing control eye from the elevating and firing controls support. Remove the set screw holding the cable and fittings in the elevating and fire controls support and withdraw the firing control plunger and cable and fittings (fig. 69). Unscrew the plunger from the cable and fittings.

(4) Unscrew the set screw on the top side of the shoulder guard support (fig. 41). This set screw locks the firing mechanism lever pin which can now be unscrewed. Take out the cotter pin from the head-

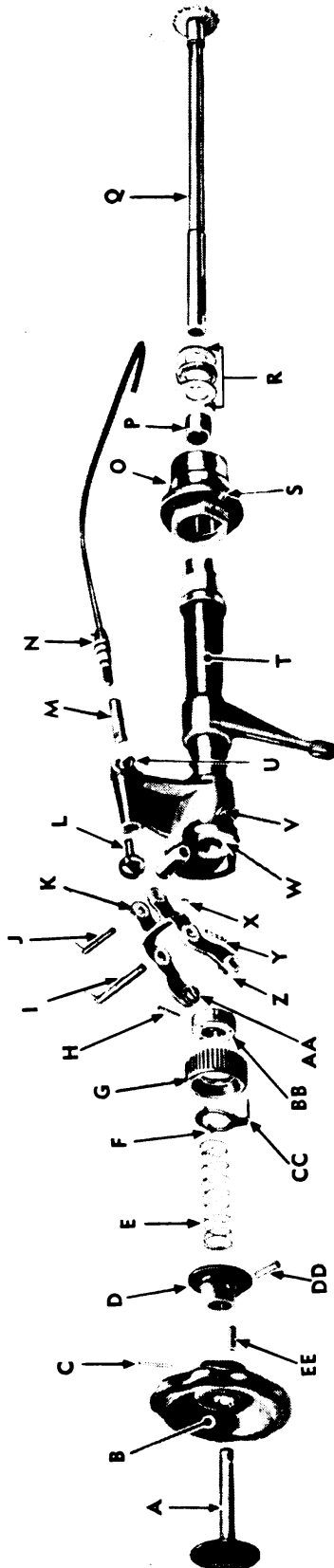
ORDNANCE MAINTENANCE — 37-MM ANTITANK GUNS M3 AND M3A1
AND CARRIAGES M4 AND M4A1



RA PD 81549

Figure 65 — Firing Mechanism Group Parts on Carriage M4 — Exploded View

DISASSEMBLY AND ASSEMBLY



- | | | |
|--|--|---|
| A — PLUNGER, FIRING | L — EYE, FIRING CONTROL | W — BUSHING, ELEVATING AND FIRING
CONTROLS' SUPPORT |
| B — KNOB, ELEVATING | M — PLUNGER, FIRING CONTROL | X — PIN, COTTER, SPLIT |
| C — PIN, STRAIGHT | N — CABLE AND FITTINGS | Y — PIN, COTTER, SPLIT |
| D — DISK, FIRING CONTROL | O — NUT, COUPLING | Z — ROLLER, FIRING CONTROL LINK |
| E — SPRING, FIRING PLUNGER | P — BUSHING, COUPLING NUT | AA — PIN, FIRING CONTROL LINK ROLLER |
| F — SCREW, MACHINE | Q — GEAR, SHAFT, LONG | BB — COLLAR, SHAFT GEAR |
| G — NUT, SERRATED, ELEVATING
MECHANISM | R — BEARING, THRUST | CC — SPRING, LOCKING, ELEVATING
MECHANISM |
| H — PIN, STRAIGHT | S — SCREW, SET, SOCKET HEAD | DD — PIN, STRAIGHT |
| I — PIN, HEADLESS | T — SUPPORT, ELEVATING AND FIRE
CONTROLS | EE — KEY, SQUARE |
| J — PIN, HEADLESS | U — SCREW, SET, SOCKET HEAD | |
| K — LINK, FIRING CONTROL | V — SCREW, SET, SOCKET HEAD | |

RA PD 81553

Figure 66 — Firing and Elevating Mechanism Controls on Carriage M4 — Exploded View

**ORDNANCE MAINTENANCE — 37-MM ANTITANK GUNS M3 AND M3A1
AND CARRIAGES M4 AND M4A1**

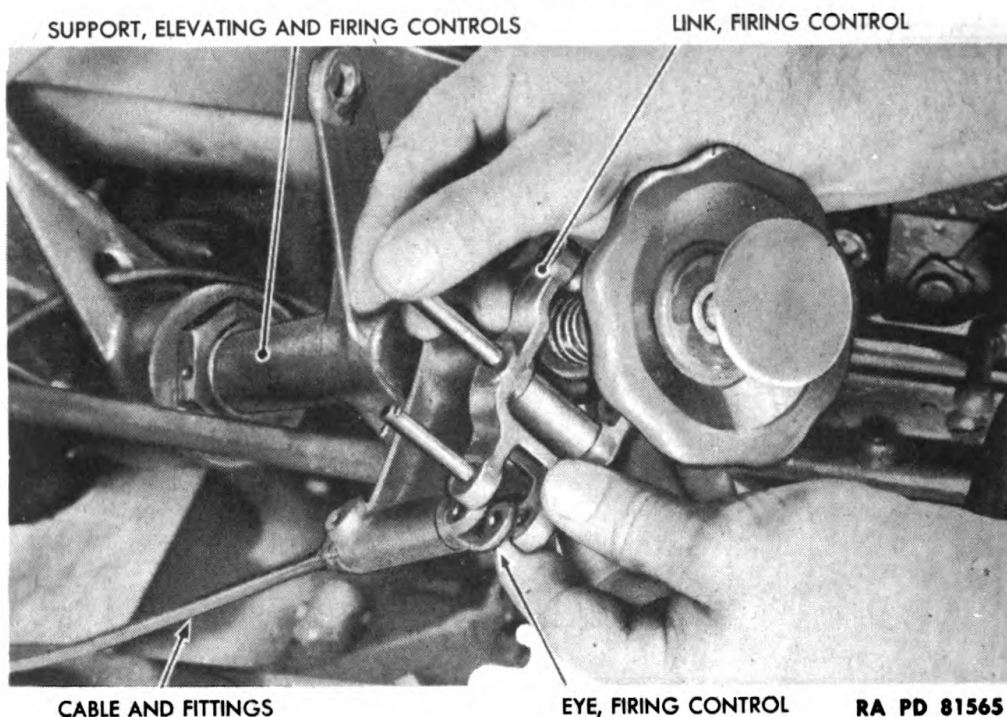


Figure 67 — Removing Firing Control Link from Carriage M4

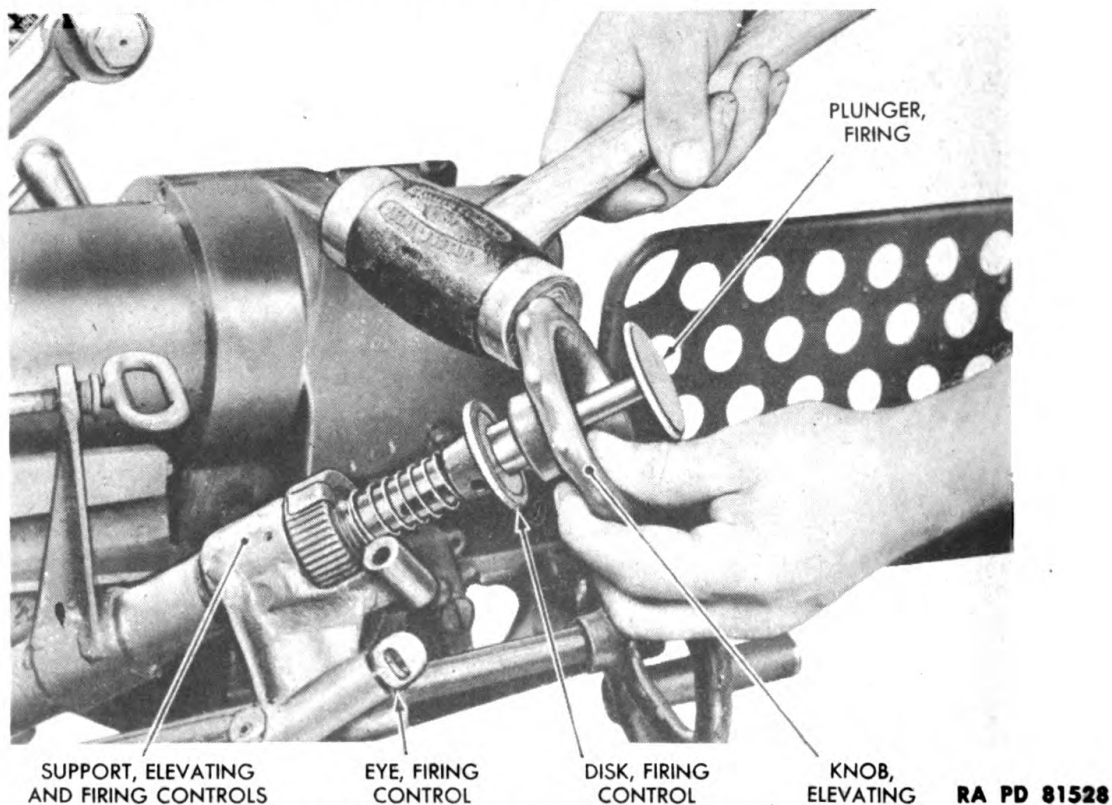
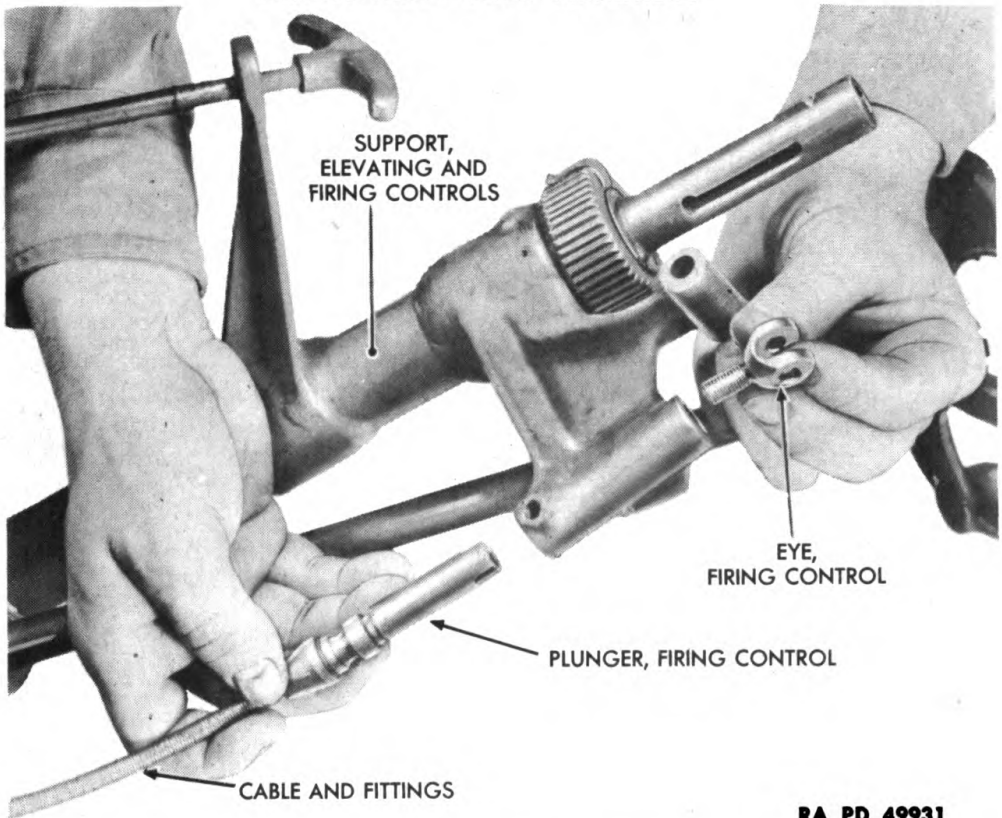


Figure 68 — Removing Elevating Knob and Firing Plunger from Carriage M4

DISASSEMBLY AND ASSEMBLY



RA PD 49931

Figure 69 — Removing the Firing Control Eye and the Firing Control Plunger from Carriage M4

less pin connecting the firing mechanism plunger to the firing mechanism lever. Remove the headless pin and plain washer. The lever will now come away (fig. 70).

(5) Unscrew the cable and fittings from the front end of the cable and fittings housing, and pull the cable and fittings, firing mechanism plunger, and firing mechanism spring forward. Grasp the end of the cable with narrow pliers inserted through the spring and unscrew the firing mechanism plunger (fig. 71). Remove the plunger and spring.

(6) Remove the cable and fittings housing by removing the two screws and two straight pins holding the housing to the shoulder guard support.

c. **Assembly and Installation on Carriage M4A1.** With the firing lever in position on the shoulder guard support, install the screw that holds it in place. Lock the screw by replacing its set screw in the top of the shoulder guard support (fig. 41).

d. **Assembly and Installation on Carriage M4** (figs. 65 and 66).

(1) Screw the cable and fittings into the front of the cable and fittings housing. Push the firing control plunger onto the cable and

ORDNANCE MAINTENANCE — 37-MM ANTITANK GUNS M3 AND M3A1
AND CARRIAGES M4 AND M4A1

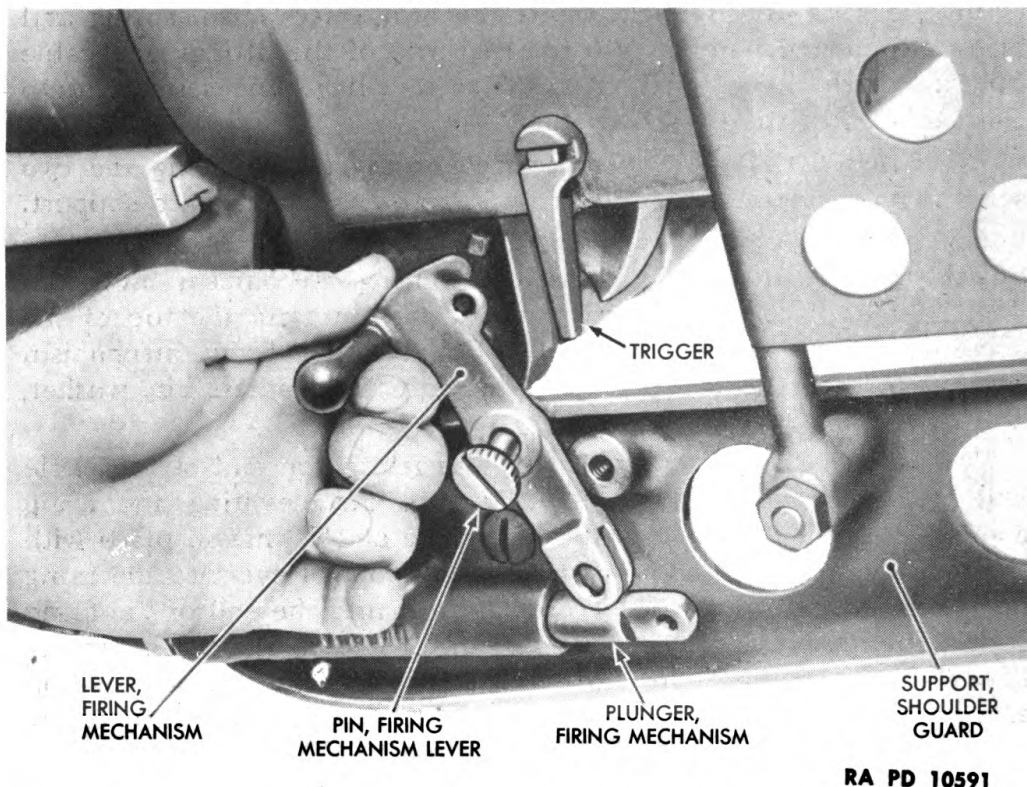


Figure 70 — Removing the Firing Mechanism Lever from Carriage M4

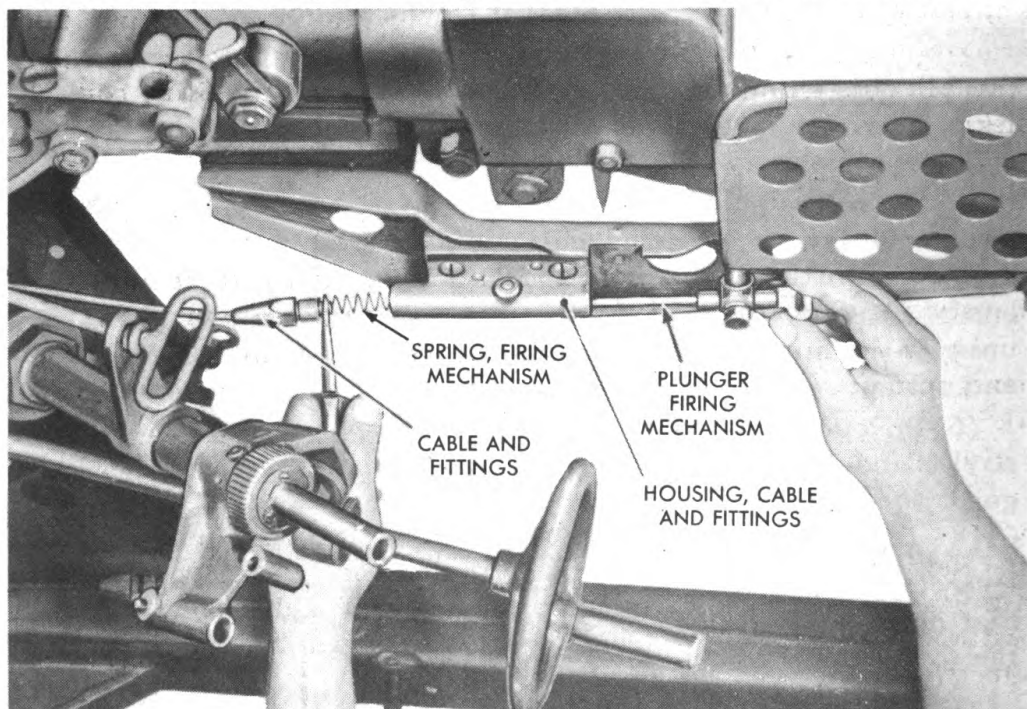


Figure 71 — Removing Firing Mechanism Plunger (Carriage M4)

DISASSEMBLY AND ASSEMBLY

fittings to take up all slack. Insert the firing mechanism spring and firing mechanism plunger into the rear end of the fittings and cable housing. Push the plunger in as far as it will go and screw it onto the cable and fittings.

(2) Install the cable and fittings housing by replacing the two screws and two straight pins holding it to the shoulder guard support.

(3) Place the firing mechanism lever in position on the shoulder guard support and secure it with the firing mechanism lever pin (fig. 70). Replace the set screw which goes in from the top of the shoulder guard support (fig. 41). Connect the firing mechanism plunger to the firing mechanism lever with the headless pin, washer, and cotter pins.

(4) Assemble the firing control plunger to the end of the cable and fittings, and insert the assembly into the elevating and firing controls support (fig. 69). Secure the cable and fittings in place with the socket-head set screw. Insert the firing control eye into the firing and elevating controls support, and screw it into the end of the firing control plunger. Connect the firing control eye to the firing control link with the headless pin and cotter pins. Place the link in position and secure it with straight pins. Lock the pins in place with cotter pins (fig. 67).

(5) Place the firing plunger spring and the firing control disk on the long shaft gear. Replace the key in the long shaft gear. Place the elevating knob in position on the long shaft gear and put the firing plunger in place through the elevating knob. Replace the pin that locks the elevating knob and the pin that locks the firing control disk.

16. ELEVATING MECHANISM.

a. Removal.

NOTE: On the M4 Carriage, it is first necessary to remove the elevating knob and then the firing controls. See paragraph 15 b.

(1) Disconnect the traversing mechanism lever by loosening the hexagonal nut and then unscrewing the traversing mechanism lever rod from the rod end yoke (fig. 72). Pull out the lever rod from the elevating controls support.

(2) Remove the cotter pin from the front of the flexible joint on the traversing shaft. Uncouple the controls bracket housing from the elevating controls support by removing the cap screw, jam nut, and washer. Remove the traversing shaft, flexible joint, controls bracket housing, and traversing knob (Carriage M4A1) or traversing handwheel (Carriage M4) as a unit (fig. 73).

(3) Remove the set screw that locks the coupling nut to the left side of the top carriage (fig. 74). Unscrew the elevating controls support with the combination wrench (fig. 75).

**ORDNANCE MAINTENANCE — 37-MM ANTITANK GUNS M3 AND M3A1
AND CARRIAGES M4 AND M4A1**

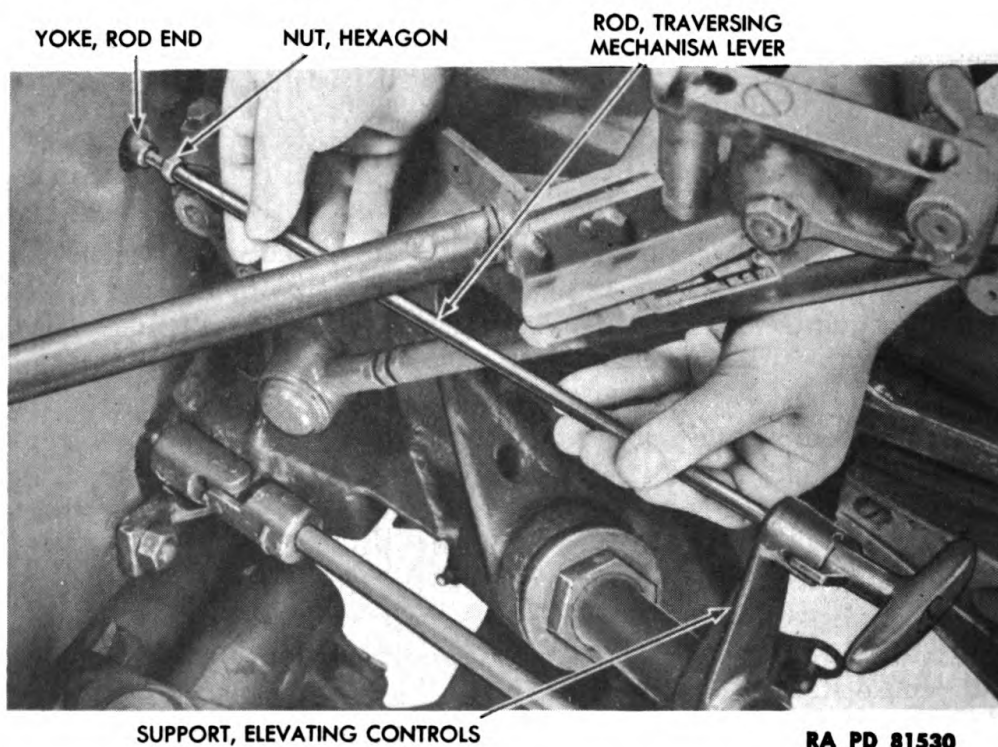


Figure 72 — Removing Traversing Mechanism Lever Rod

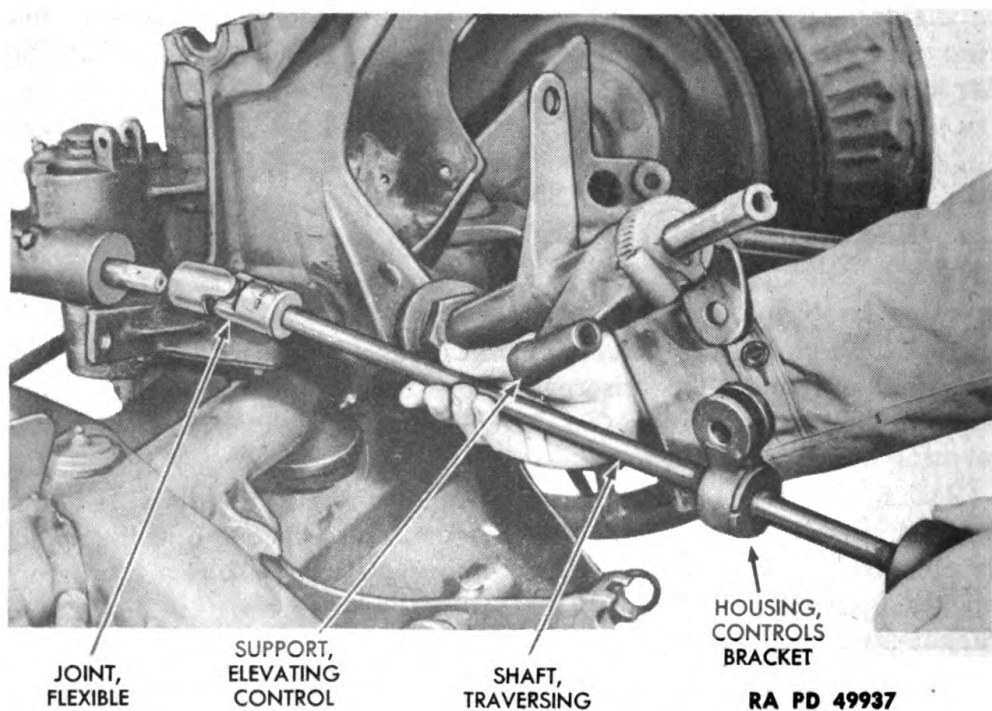
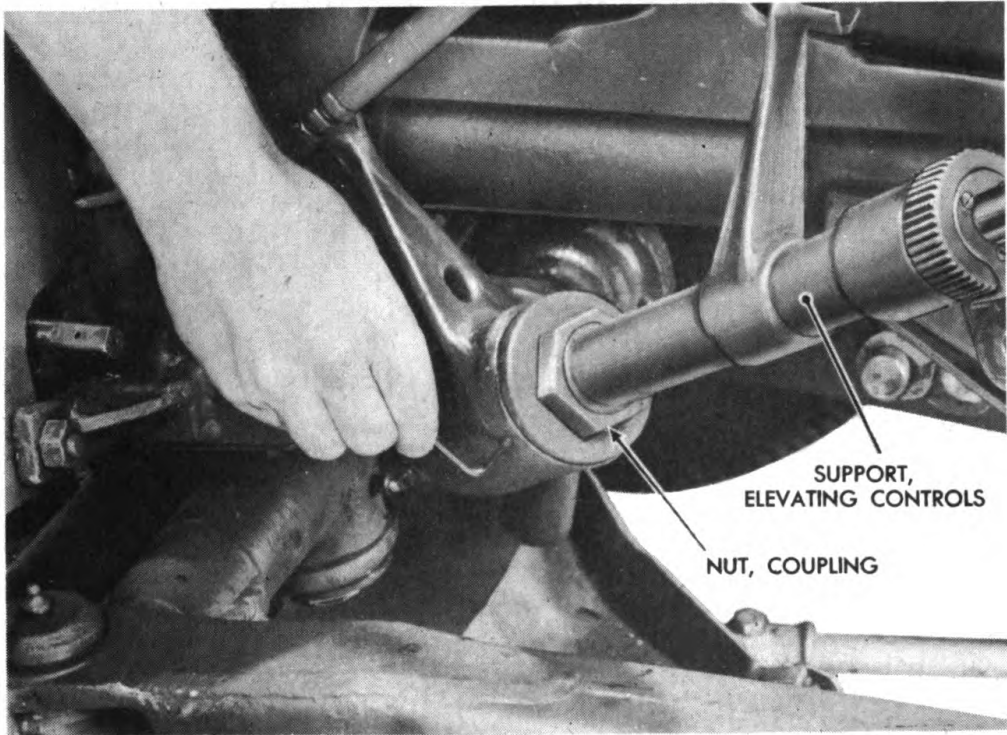


Figure 73 — Removing the Traversing Shaft, Flexible Joint, and Controls Bracket Housing

DISASSEMBLY AND ASSEMBLY

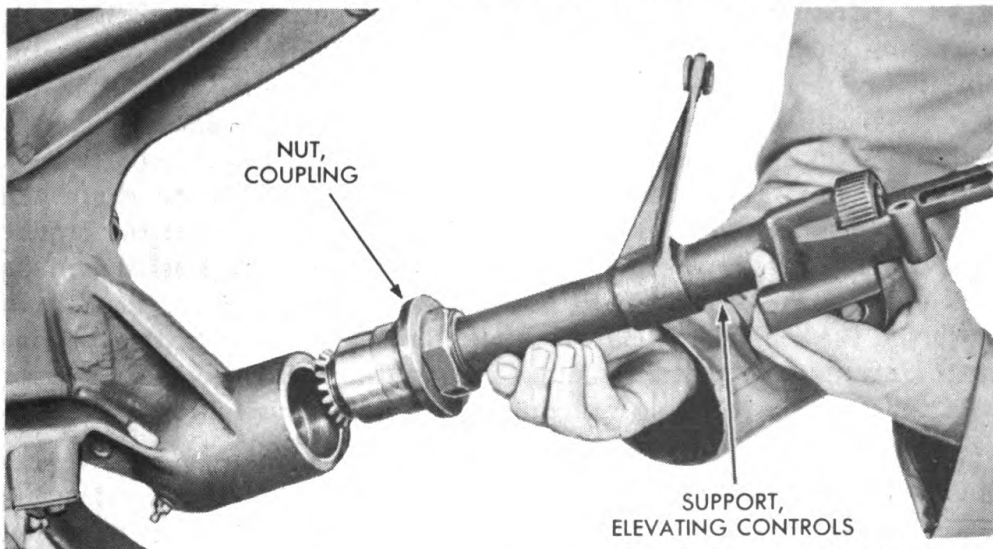


RA PD 81582

Figure 74 — Removing the Set Screw from the Coupling Nut

NOTE: The elevating controls support on the M4A1 Carriage is equivalent to the elevating and firing controls support on the M4 Carriage.

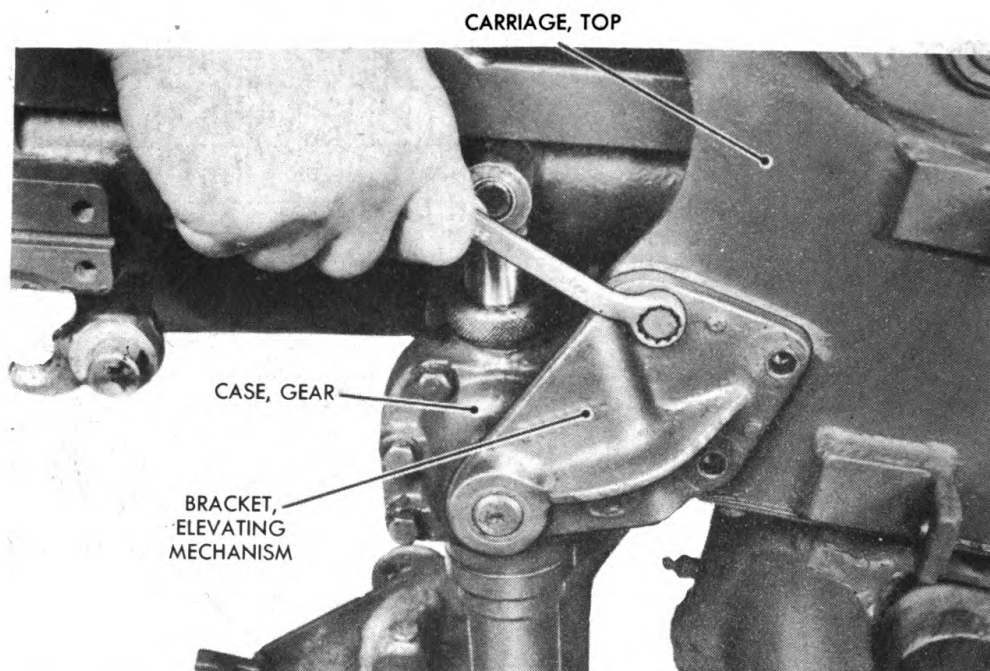
(4) Remove the elevating mechanism bracket from the top carriage by removing the locking wire and the three cap screws (fig. 76).



RA PD 49932

Figure 75 — Removing the Elevating Controls Support

ORDNANCE MAINTENANCE — 37-MM ANTITANK GUNS M3 AND M3A1 AND CARRIAGES M4 AND M4A1



RA PD 81537

Figure 76 — Removing the Elevating Mechanism Bracket

Grasp the elevating gear case and pull it to the right (fig. 77).

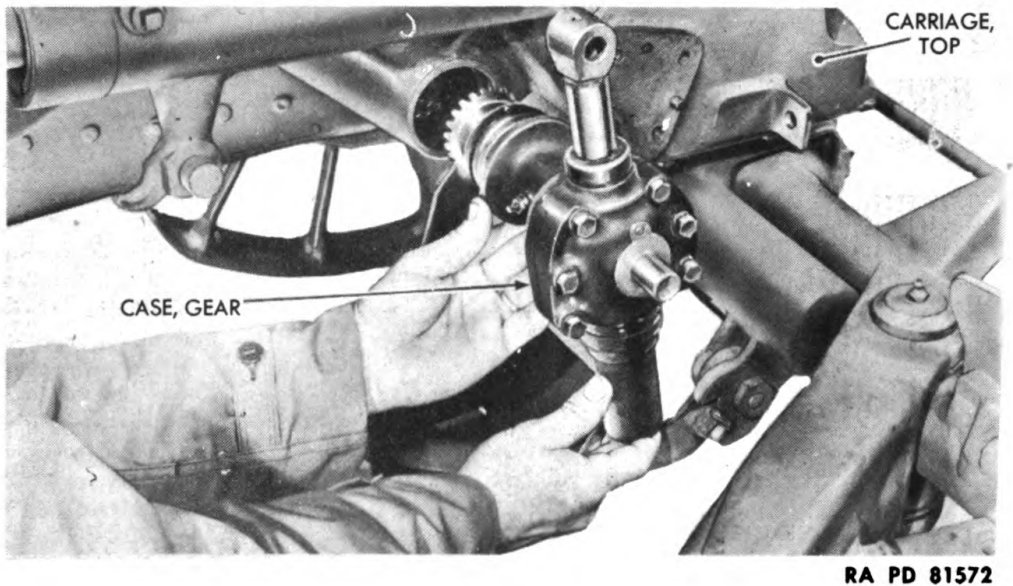
NOTE: A slight up and down movement of the recoil cylinder will make the removal easier.

b. Disassembly.

(1) **ELEVATING CONTROLS SUPPORT** (figs. 66 and 78). Remove the elevating handwheel by removing the cotter pin and nut and tapping the handwheel gently to the rear. Remove the three screws that hold the elevating mechanism locking spring to the long shaft gear collar and remove the spring. Remove the elevating mechanism serrated nut (fig. 79). Remove the straight pin from the long shaft gear collar (fig. 80) and remove the collar. Remove the controls bracket housing by unscrewing the jam nut and removing the washer and cap screw. Remove the long shaft gear (fig. 81). Remove the thrust bearing from the long shaft gear. Remove the set screw from the coupling nut. Unscrew the coupling nut from the elevating controls support and tap out the coupling nut bushing from the nut.

(2) **ELEVATING GEAR CASE** (fig. 82). Loosen the gear case cap and unscrew the elevating screw (fig. 83). Remove the gear case cap and the felt washer from the elevating screw and tap out the elevating screw bushing. Remove the set screw from the elevating screw thimble and, while holding the bevel transfer gear to prevent it from

DISASSEMBLY AND ASSEMBLY



RA PD 81572

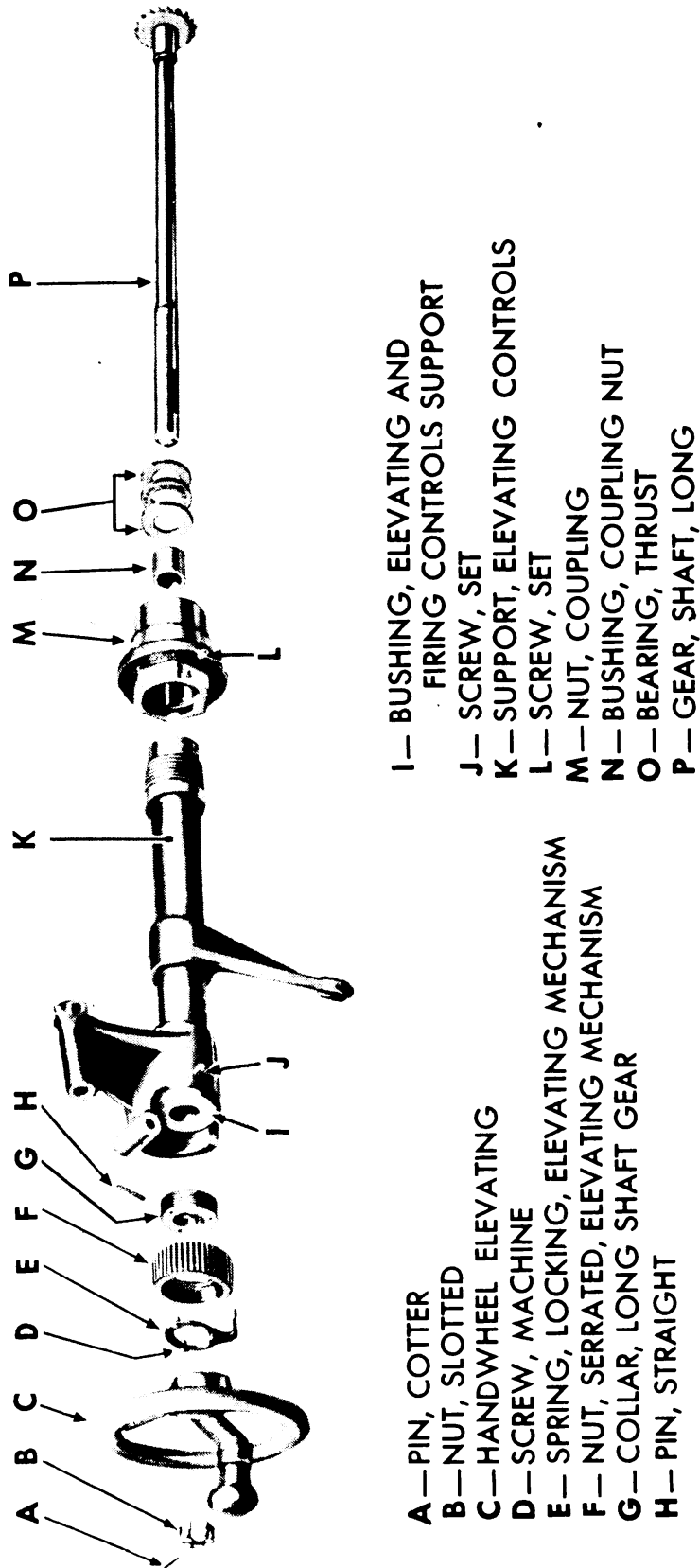
Figure 77 — Removing the Elevating Gear Case

turning, unscrew the thimble from the elevating screw bevel gear in the elevating case (fig. 84). Remove the thimble cup from its pins on the gear case (fig. 85). Remove the six cap screws and washers from the right half gear case and pry the right half gear case loose with a cold chisel and hammer (fig. 86). The elevating screw bevel gear and elevating screw gear washer will then come away. Remove the cotter pin from the short shaft gear nut and remove the nut (fig. 87). Tap the transfer bevel gear off the short shaft gear (fig. 88). Remove the thrust ball bearing and oil retainer. Remove the short shaft gear and thrust ball bearing from the left half gear case (fig. 89). Remove the thrust ball bearing from the short shaft gear.

c. Assembly.

(1) **GEAR CASE** (fig. 80). Replace the short shaft gear and thrust bearing in the left half gear case (fig. 89). Replace the oil retainer, thrust bearing, and transfer bevel gear on the short shaft gear (fig. 88). Screw on the short shaft gear nut and lock it with the cotter pin (fig. 87). Replace the elevating screw bevel gear and the elevating screw gear washer in the left half gear case. Assemble the right half gear case to the left half and secure it in place with the six cap screws and lock washers (fig. 86). Replace the elevating screw thimble cup making sure that it fits over its pins on the gear case (fig. 85). Screw the elevating screw thimble onto the elevating screw holding the bevel gear to prevent it from turning. Lock the elevating screw thimble in place with the set screw (fig. 84). Replace the elevating screw bushing. Put the gear case cap and the felt washer on the elevating screw. Screw the elevating screw through the elevating gear case into elevating screw bevel gear (fig. 83).

ORDNANCE MAINTENANCE — 37-MM ANTITANK GUNS M3 AND M3A1
AND CARRIAGES M4 AND M4A1



RA PD 81591

Figure 78 — Elevating Mechanism Controls on Carriage M4A1 — Exploded View

DISASSEMBLY AND ASSEMBLY

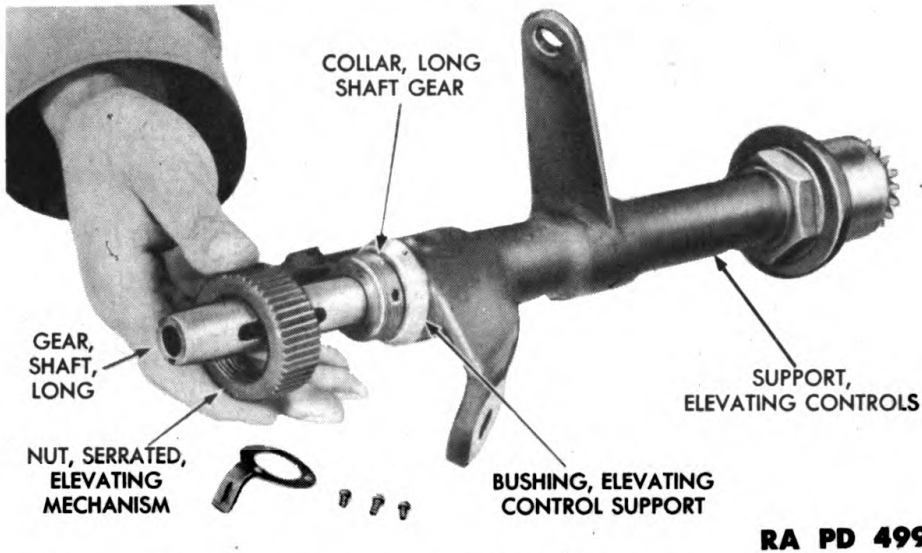


Figure 79 — Removing the Elevating Mechanism Serrated Nut

(2) **ELEVATING CONTROLS SUPPORT** (fig. 78). Replace the coupling nut bushing in the coupling nut and screw the nut onto the elevating controls support. Replace the elevating controls support bushing and lock it with its set screw. Assemble the thrust bearing on the long shaft gear and replace the long shaft gear into the elevating controls support (fig. 81). Replace the long shaft gear collar with its three holes to the outside and replace the straight pin in the collar (fig. 80). Screw the elevating mechanism serrated nut onto the collar (fig. 79). Place the elevating mechanism locking spring against the serrated nut and screw the three machine screws through the spring

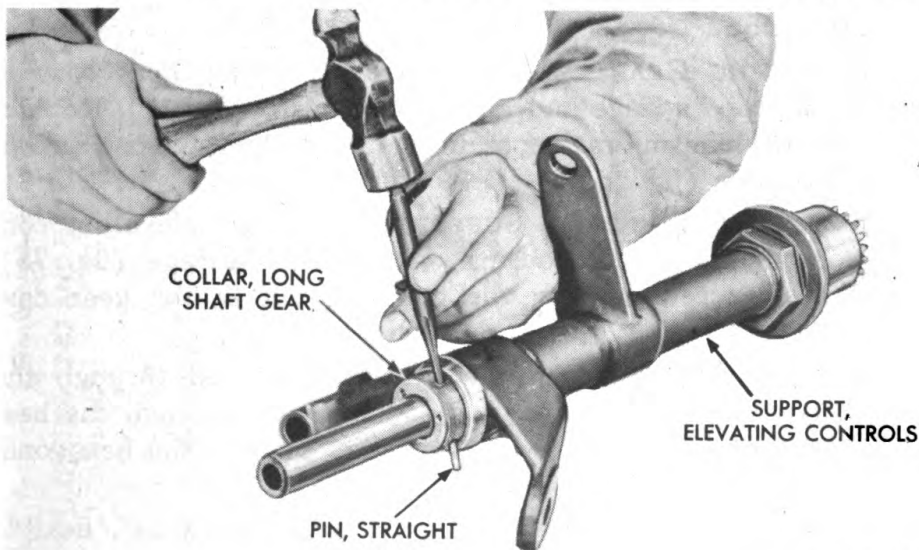
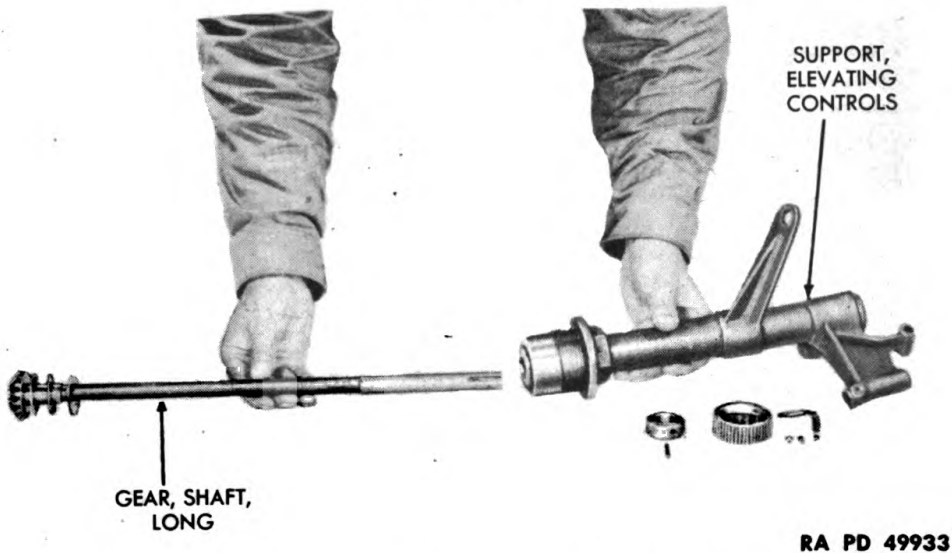


Figure 80 — Removing the Pin from the Long Shaft Gear Collar

ORDNANCE MAINTENANCE — 37-MM ANTITANK GUNS M3 AND M3A1 AND CARRIAGES M4 AND M4A1



RA PD 49933

Figure 81 — Removing the Long Shaft Gear from the Elevating Controls Support

and into the long shaft gear collar. Replace the controls bracket housing and secure it with the cap screw, washer, and jam nut. Tap the handwheel into place on the long shaft gear and secure with its nut and cotter pin.

NOTE: On the M4 Carriage (fig. 66) it is necessary to replace the key in the long shaft gear and to replace and lock the elevating knob with the straight pin in addition to replacing the firing controls (par. 15 d).

d. Installation.

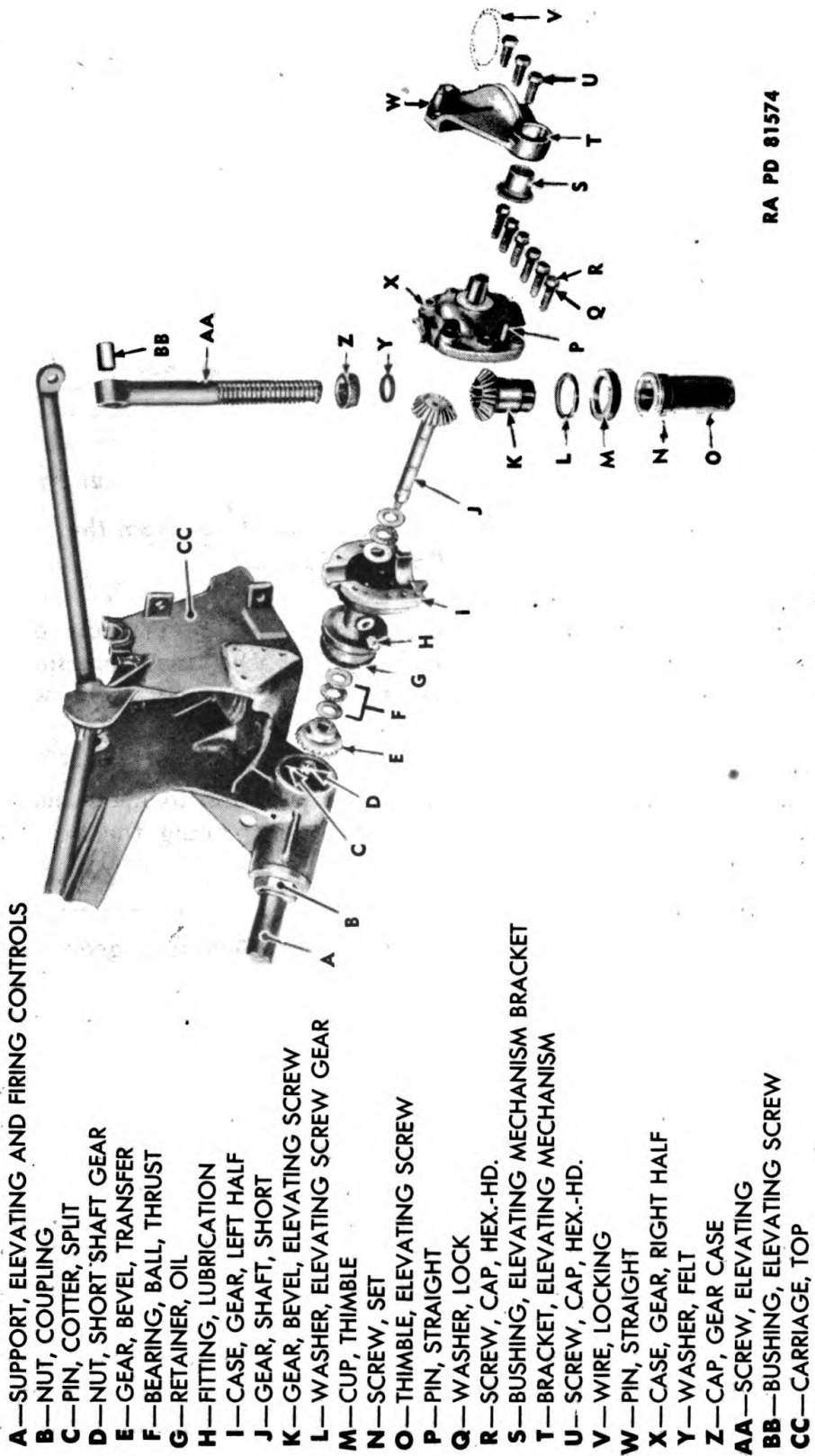
(1) **ELEVATING GEAR CASE.** Place the elevating gear case in position on the top carriage and recoil mechanism (fig. 77). Replace the elevating mechanism bracket, securing it with the three cap screws, and the safety wire (fig. 76),

(2) **ELEVATING CONTROLS SUPPORT.** Screw the elevating controls support tightly in its housing on the top carriage (fig. 75). Replace the set screw holding the coupling nut in the gear case (fig. 74).

(3) Replace the traversing mechanism lever rod through the elevating controls support, through the shield, and through the hexagonal nut and screw it to the rod end yoke. Tighten the hexagonal nut (fig. 72).

(4) Couple the traversing shaft, traversing handwheel, flexible joint, and controls bracket housing to the elevating controls support with the cap screw, washer, and jam nut (fig. 73). Replace the cotter key in the flexible joint.

DISASSEMBLY AND ASSEMBLY



RA PD 81574

Figure 82 — Elevating Mechanism — Exploded View

ORDNANCE MAINTENANCE — 37-MM ANTITANK GUNS M3 AND M3A1
AND CARRIAGES M4 AND M4A1

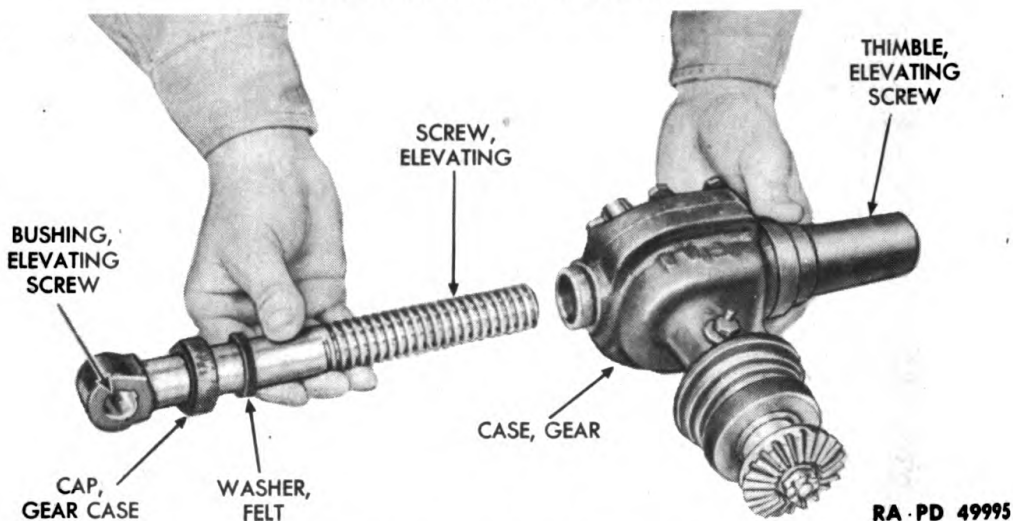


Figure 83 — Removing the Elevating Screw from the Gear Case

17. TRAVERSING MECHANISM.

a. Disassembling Traversing (Quick Release) Mechanism.

(1) Loosen the hexagonal nut and unscrew the traversing mechanism lever rod from the rod end yoke (fig. 72). Unscrew the hex-

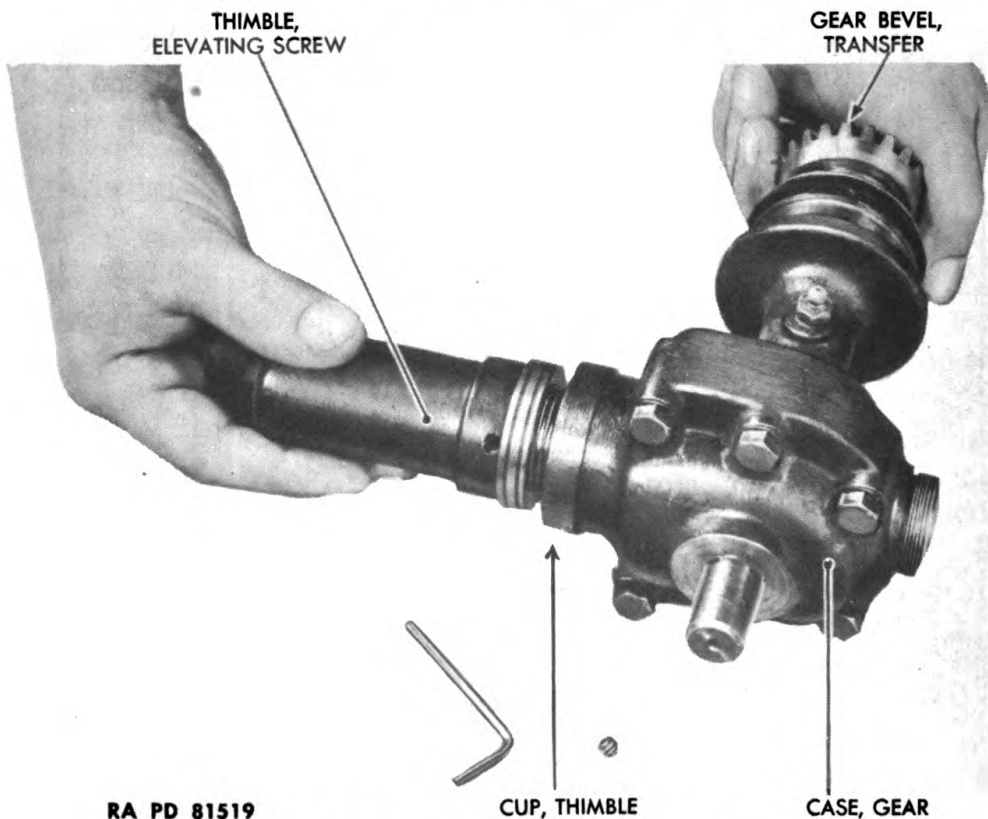


Figure 84 — Removing the Elevating Screw Thimble

DISASSEMBLY AND ASSEMBLY

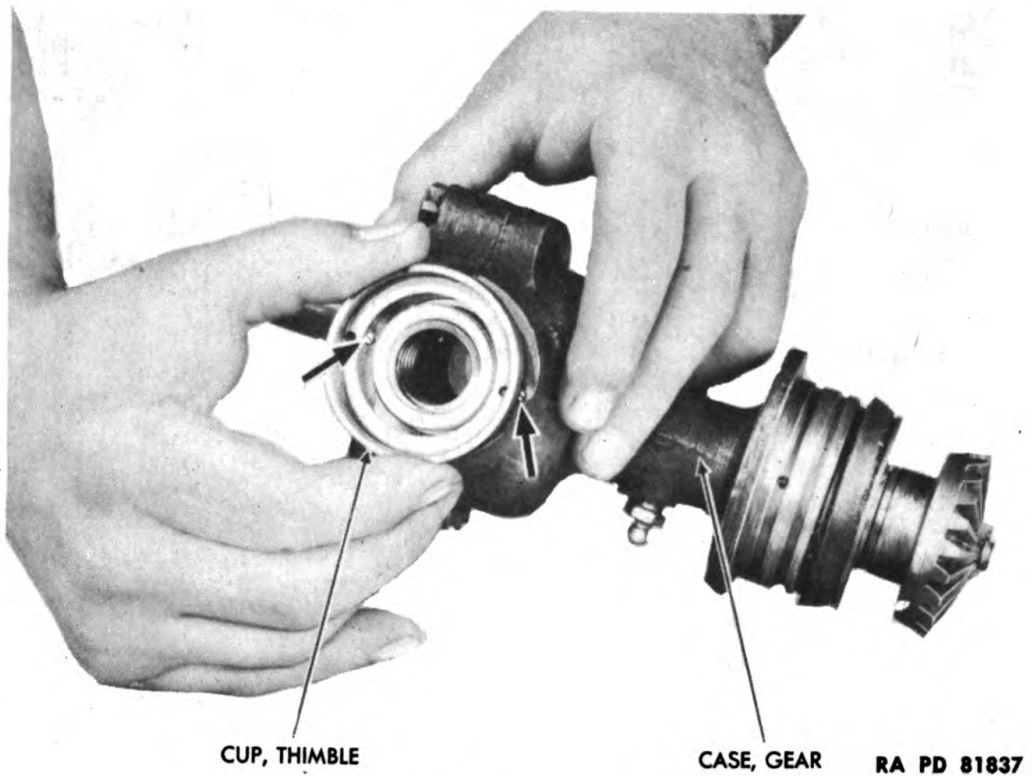


Figure 85 — Removing the Elevating Screw Thimble Cup

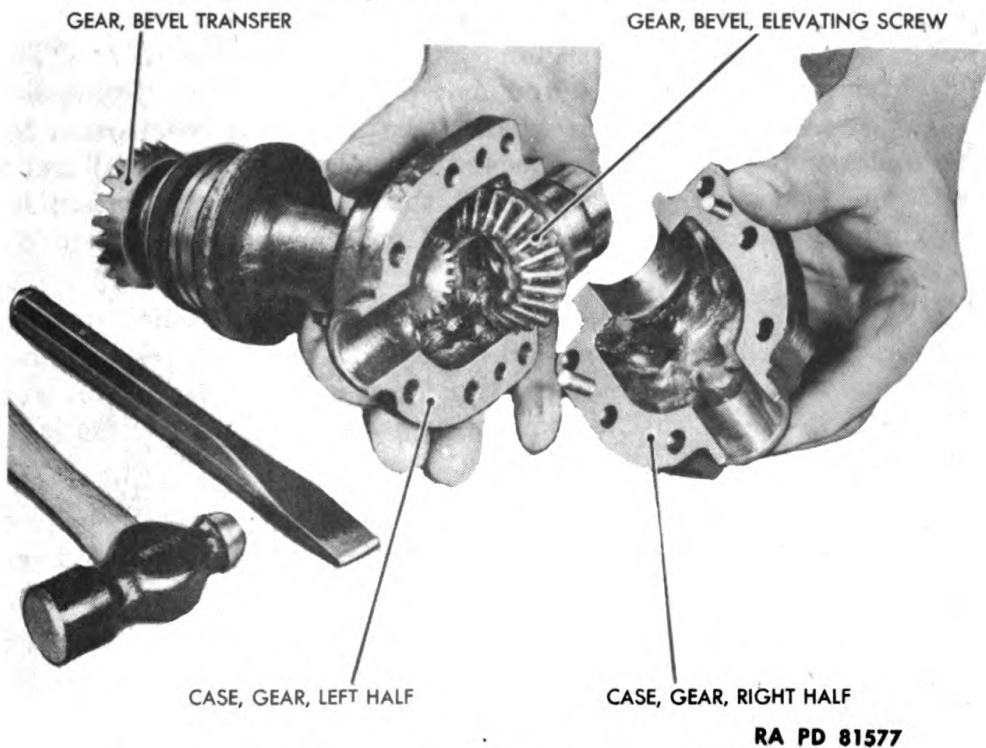
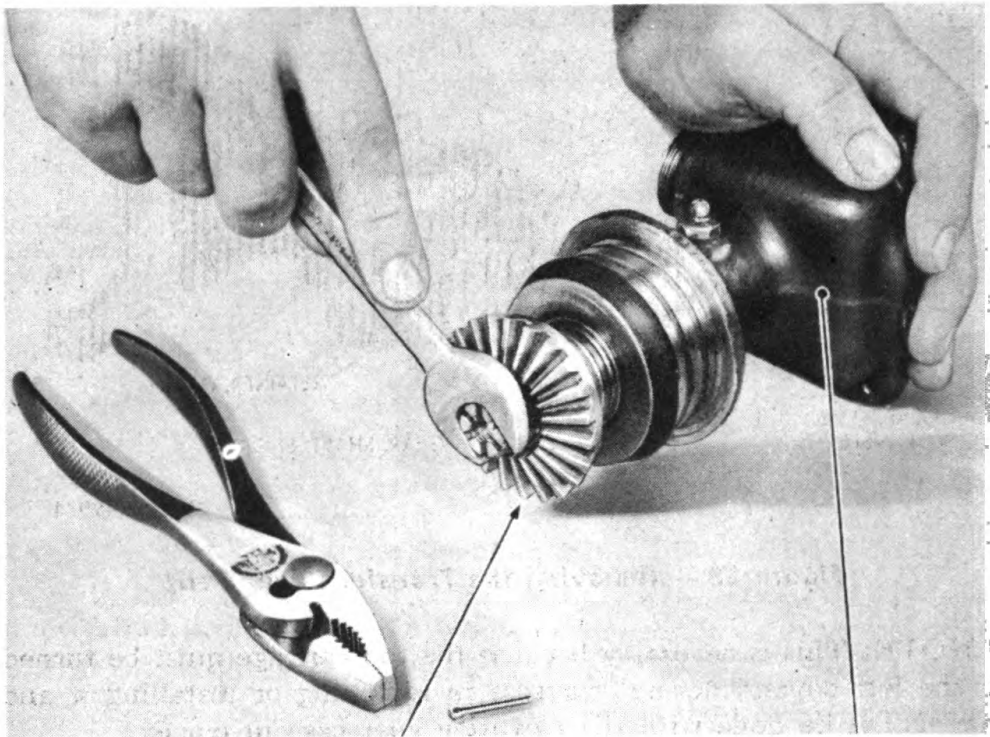


Figure 86 — Disassembling the Elevating Gear Case

ORDNANCE MAINTENANCE — 37-MM ANTITANK GUNS M3 AND M3A1
AND CARRIAGES M4 AND M4A1



GEAR, BEVEL TRANSFER

CASE, GEAR, LEFT HALF

RA PD 81559

Figure 87 — Removing the Short Shaft Gear Nut

agonal nut from the lever rod and pull out the rod. Remove the cotter pin and headless pin holding the traversing mechanism lever to the traversing mechanism cover. Remove the cotter pin and rod end pin securing the other end of the traversing mechanism lever to the rod end yoke. The lever and rod end yoke will then come away.

(2) Remove the three cap screws and lock washers from the traversing mechanism cover and remove the cover (fig. 91). Remove the traversing mechanism upper cap, the traversing mechanism clutch, and the traversing mechanism spring from the interior of the traversing mechanism housing (fig. 92).

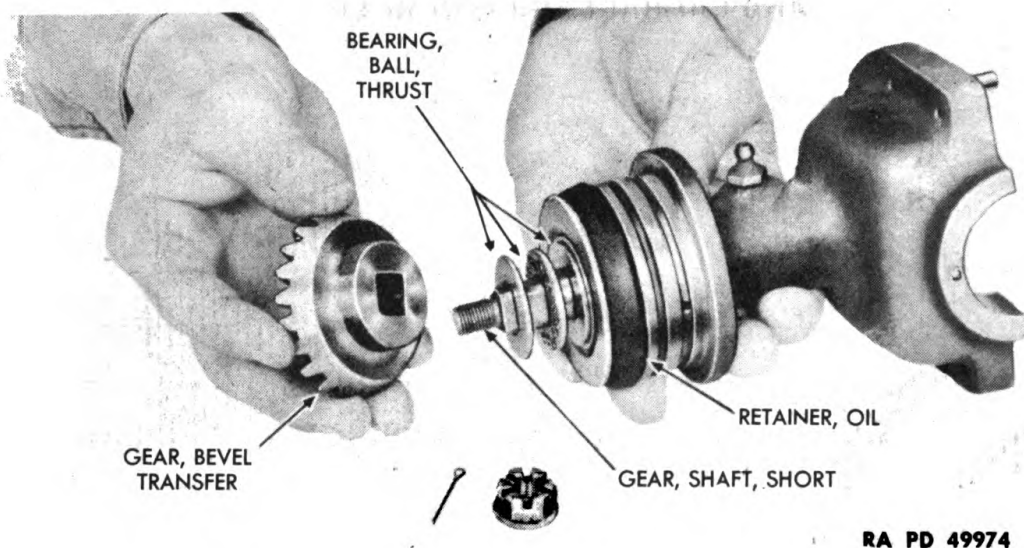
b. Disassembling Traversing Mechanism (fig. 93).

(1) Remove the shield, telescope mount, tube, sleigh, and recoil mechanism (par. 13 a).

NOTE: It is possible to remove the shield, telescope mount, and recoil mechanism as a unit with the top carriage. However, since these assemblies are easily damaged and must be handled very carefully, it is generally advisable to remove them separately.

(2) Remove the elevating gear case (par 16 a (4)).

DISASSEMBLY AND ASSEMBLY



RA PD 49974

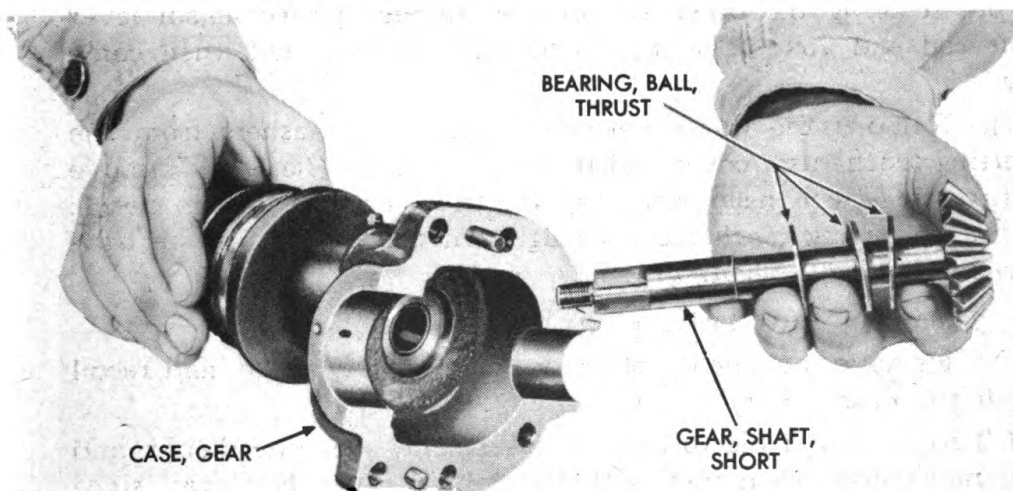
Figure 88 — Removing the Transfer Bevel Gear

NOTE: This is necessary because the top carriage must be turned to the left beyond normal traverse in removing or installing it and this cannot be done with the elevating gear case in place.

(3) Remove the traversing (quick release) mechanism (par. 17 a).

(4) Remove the elevating controls support (par. 16 a).

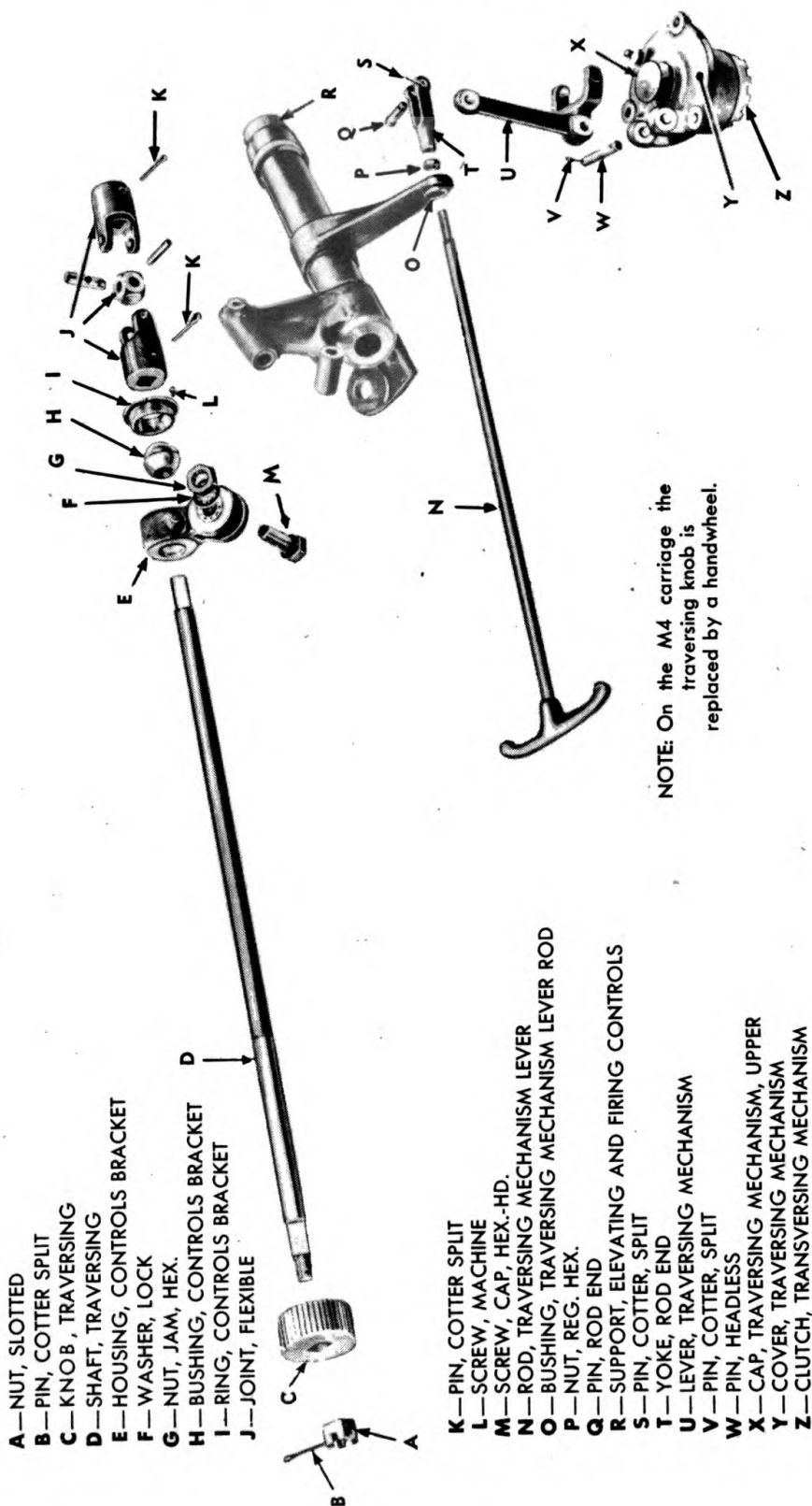
NOTE: This operation is not absolutely essential in disassembling the traversing mechanism. However, it facilitates handling of the top carriage after removal. It is, of course, necessary when disassembling the top carriage itself.



RA PD 81562

Figure 89 — Removing the Short Shaft Gear

ORDNANCE MAINTENANCE — 37-MM ANTITANK GUNS M3 AND M3A1
AND CARRIAGES M4 AND M4A1



RA PD 81560

Figure 90 — Traversing Mechanism Control Group — Exploded View

DISASSEMBLY AND ASSEMBLY

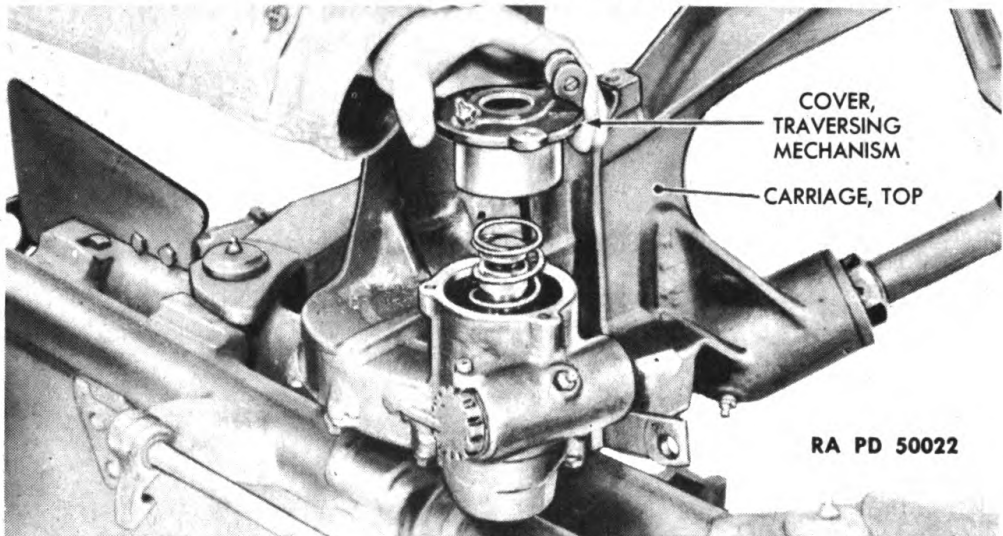
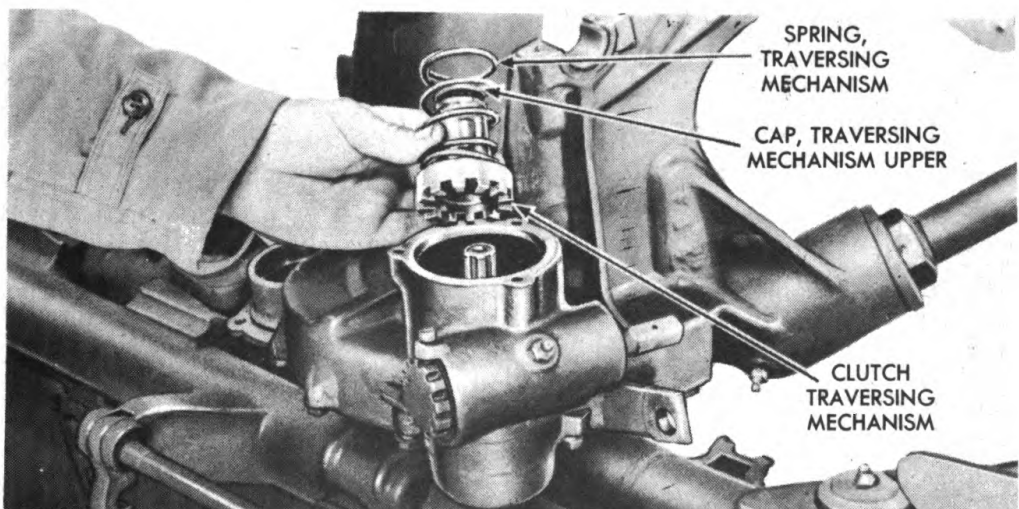


Figure 91 — Removing the Traversing Mechanism Cover

(5) Remove the cotter pin from the front half of the flexible joint at the end of the traversing shaft. Uncouple the controls bracket housing from the elevating controls support by removing the cap screw, jam nut, and washer, and remove the traversing shaft, flexible joint, and controls bracket housing as a unit (fig. 73). Remove the nut from the traversing knob and remove the knob. Pull the traversing shaft out from the controls bracket housing.

NOTE: On the M4, remove the nut and cotter pin from the traversing handwheel. Remove the machine screw from the controls bracket ring. Unscrew the ring and take out the controls bracket bushing.



RA PD 81570

Figure 92 — Removing the Traversing Mechanism Upper Cap, Traversing Mechanism Clutch, and Traversing Mechanism Spring

ORDNANCE MAINTENANCE — 37-MM ANTITANK GUNS M3 AND M3A1
AND CARRIAGES M4 AND M4A1

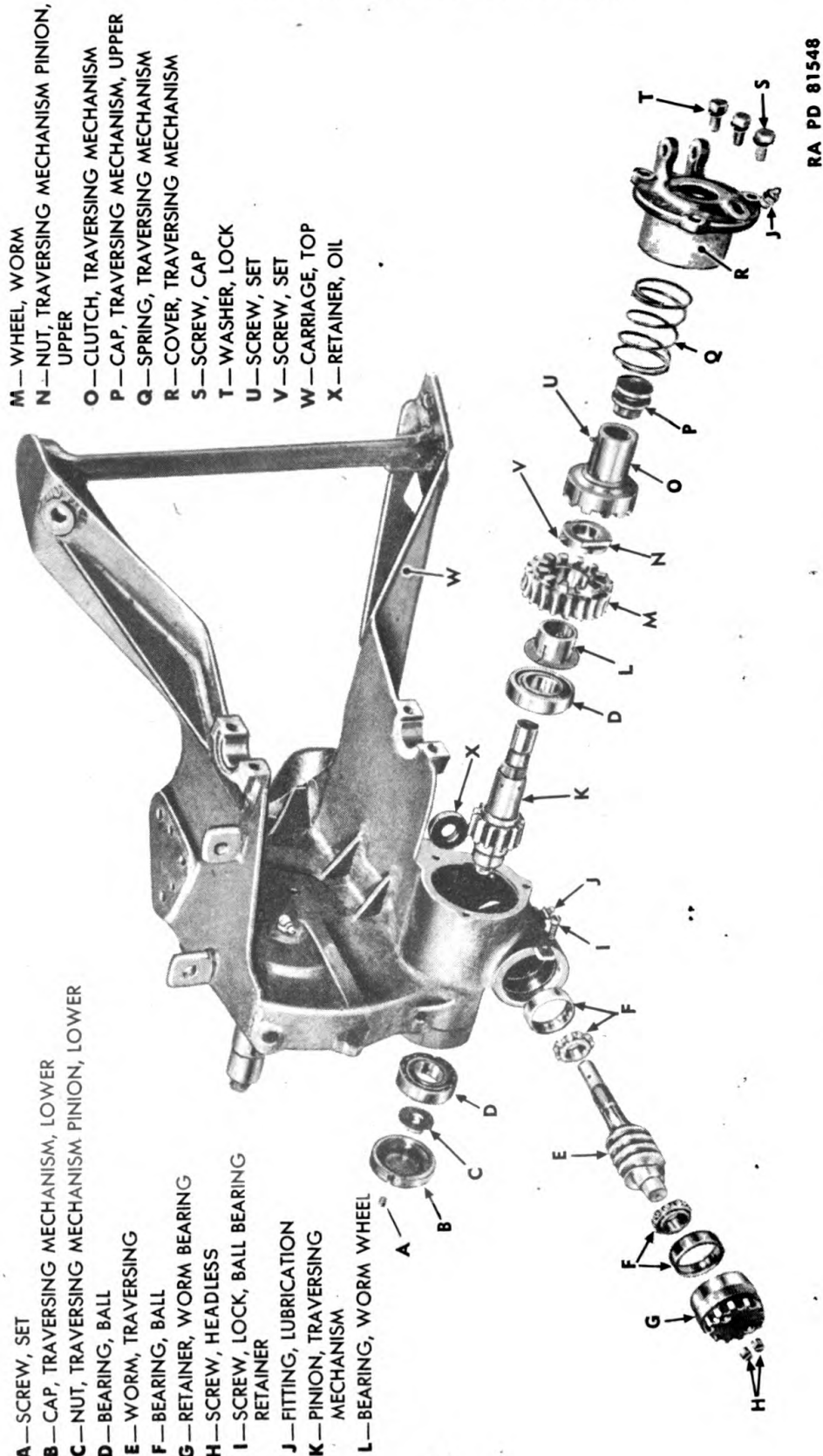
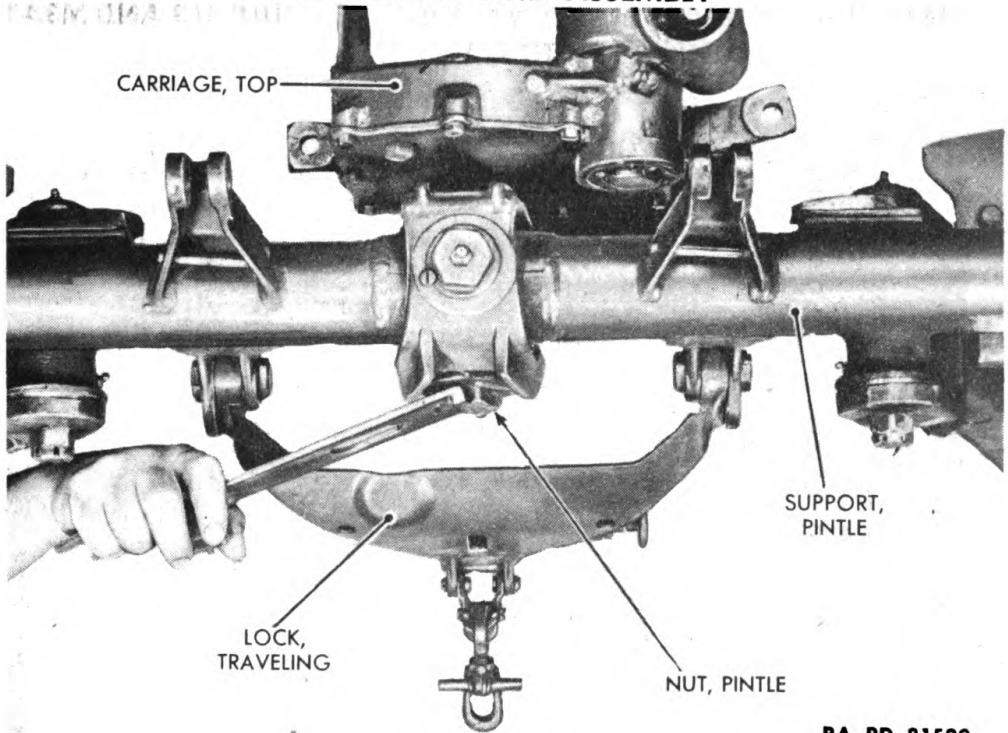


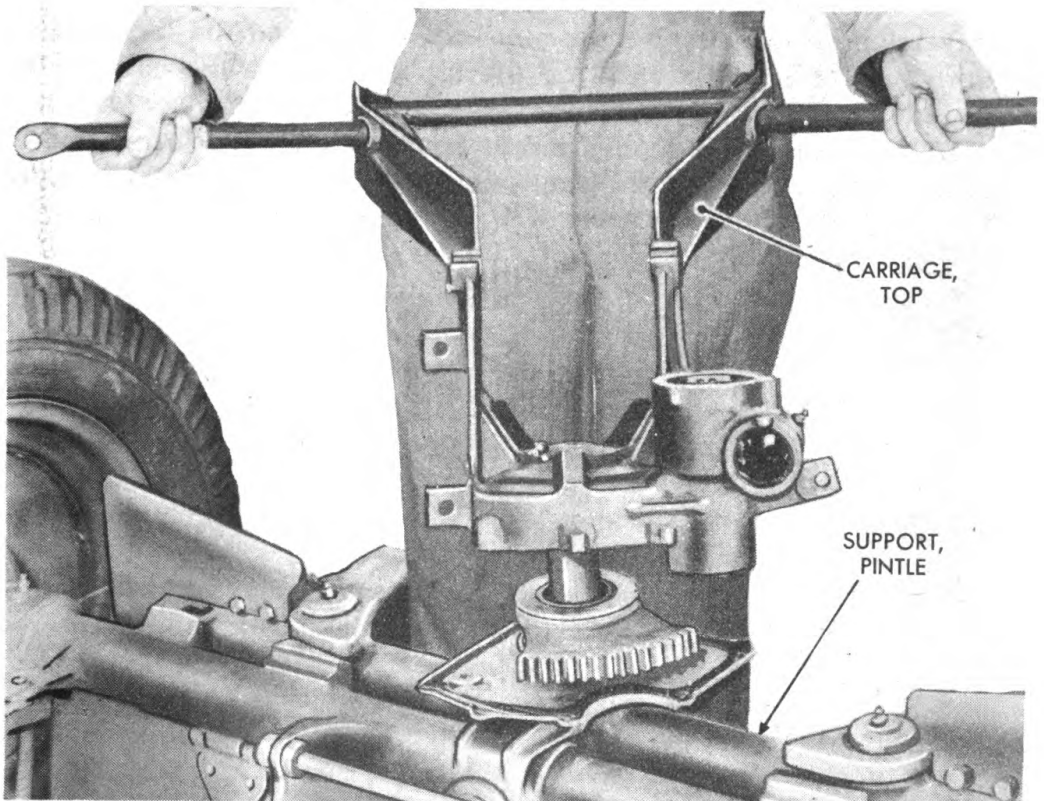
Figure 93 — Traversing Mechanism — Exploded View

DISASSEMBLY AND ASSEMBLY



RA PD 81520

Figure 94 — Removing the Pintle Nut



RA PD 50020

Figure 95 — Removing the Top Carriage

ORDNANCE MAINTENANCE — 37-MM ANTITANK GUNS M3 AND M3A1 AND CARRIAGES M4 AND M4A1

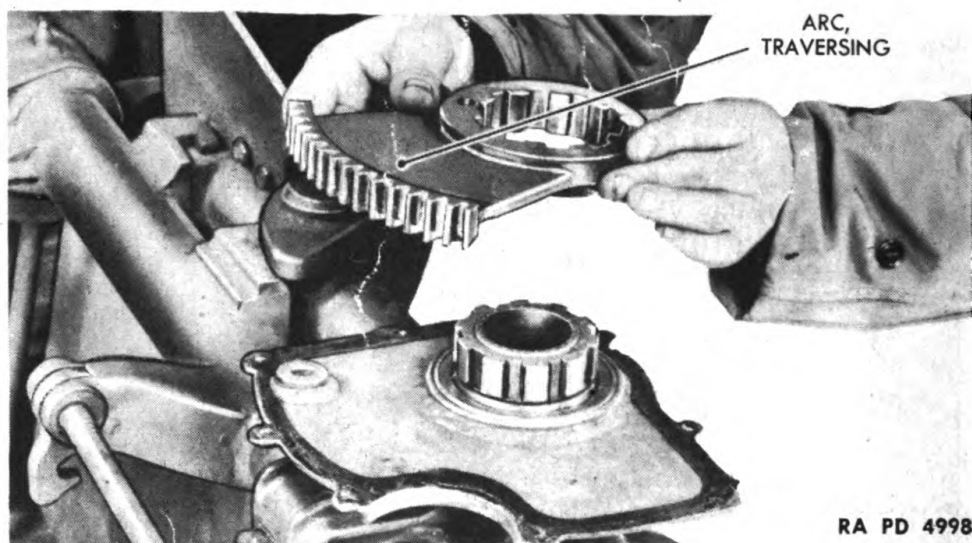


Figure 96 — Removing the Traversing Arc

(6) Unscrew the cotter pin and pintle nut from the bottom of the pintle support with the combination tool (fig. 94). Remove the pintle nut washer and the lower pintle housing washer. Remove the traversing arc stop screw, the nine cap screws, and the lock washers from the traversing arc. Swing the top carriage to the extreme left and lift it off (fig. 95).

(7) Remove the upper pintle housing washer. Place assembly prick punch marks on the traversing arc and on the pintle support

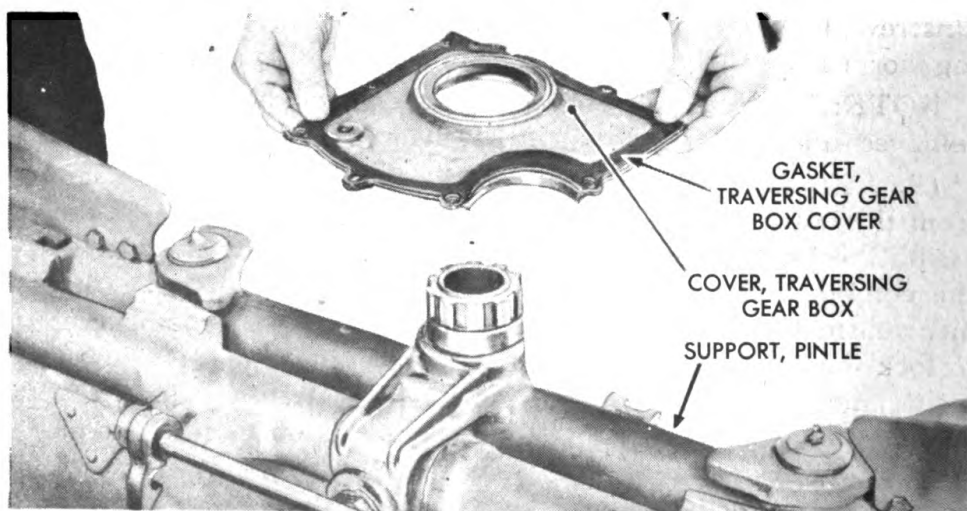
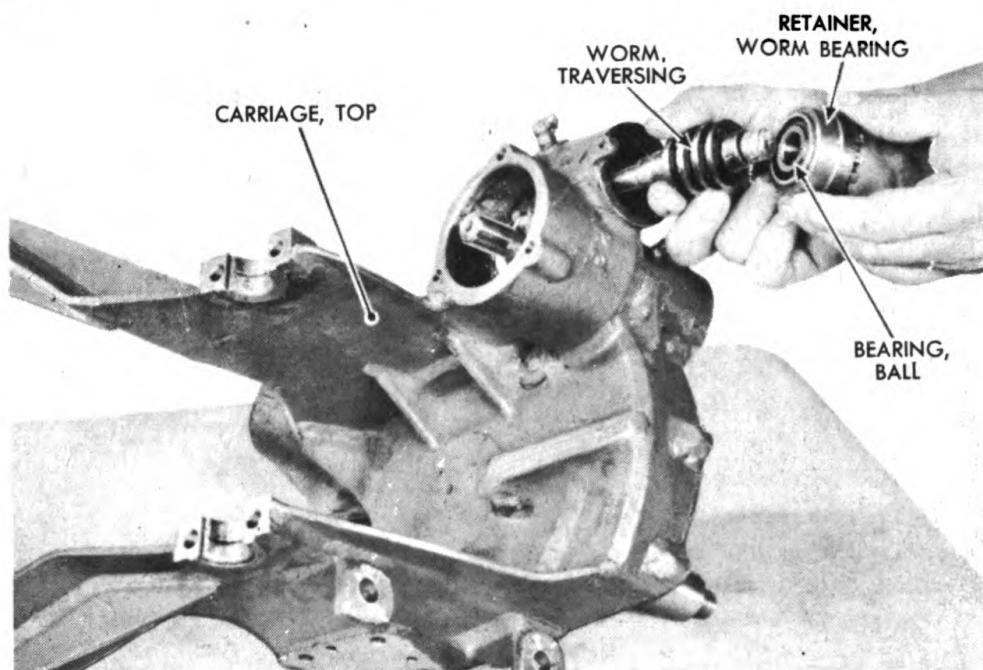


Figure 97 — Removing the Traversing Gear Box Cover and Gear Box Cover Gasket

DISASSEMBLY AND ASSEMBLY



RA PD 81586

Figure 98 — Removing the Traversing Worm Bearing Retainer, Ball Bearing, and Traversing Worm

spline. Then remove the traversing arc (fig. 96). Remove the traversing gear box cover and the traversing gear box cover gasket (fig. 97), and the oil retainer.

(8) Remove the ball bearing retainer lock screw from the worm bearing retainer in the front of the traversing mechanism housing. Unscrew the worm bearing retainer, its ball bearing, and the traversing worm from the traversing mechanism housing (fig. 98).

NOTE: The rear oil retainer and the rear ball bearing cannot be removed until the worm wheel has been removed.

(9) Turn the carriage bottom side up and remove the set screw from the lower traversing mechanism cap at the bottom of the traversing mechanism housing and remove the cap from its seat using the combination tool (fig. 99). Temporarily replace the traversing mechanism clutch in the top of the traversing mechanism housing to lock the traversing mechanism pinion and remove the lower traversing mechanism pinion nut from the bottom of the traversing mechanism pinion. Push upon the traversing mechanism pinion from the bottom and remove it and its allied parts from the top of the traversing mechanism housing (fig. 100). Remove the ball bearing from the bottom of the housing. Disassemble the traversing mechanism pinion by removing the set screw in the upper traversing mechanism pinion nut and removing the nut. Remove the worm

ORDNANCE MAINTENANCE — 37-MM ANTITANK GUNS M3 AND M3A1
AND CARRIAGES M4 AND M4A1

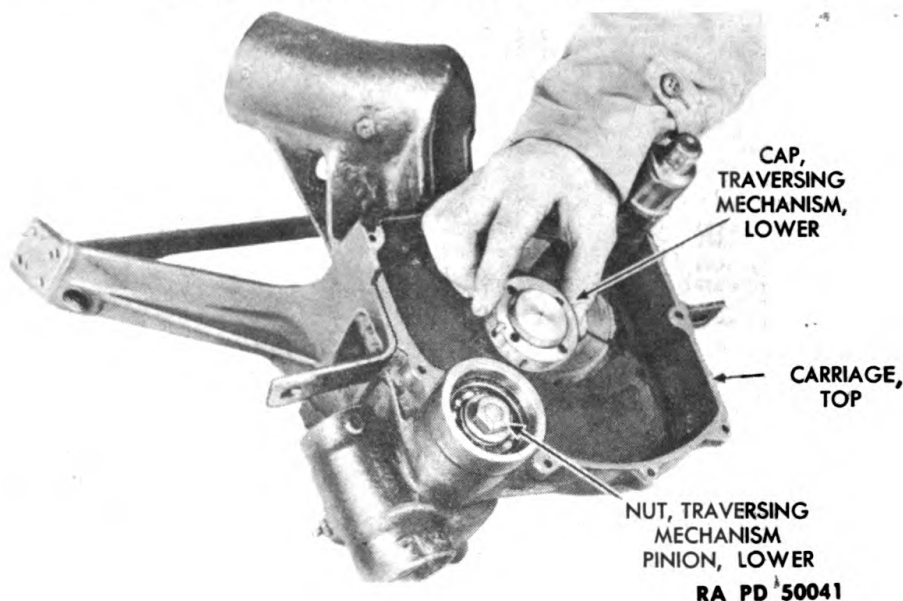


Figure 99 — Removing the Lower Traversing Mechanism Cap

wheel from the pinion (fig. 101). Remove the worm wheel bearing and ball bearing from the pinion.

(10) Tap out the rear ball bearing of the traversing worm housing toward the front, tilting the top carriage so that the ball bearings will fall into the pinion housing (fig. 102). Tap the ball bearing race out toward the front and the rear oil retainer out toward the rear.

NOTE: On the M4 Carriage, the bearings will remain in the bearing spacer when tapped out.

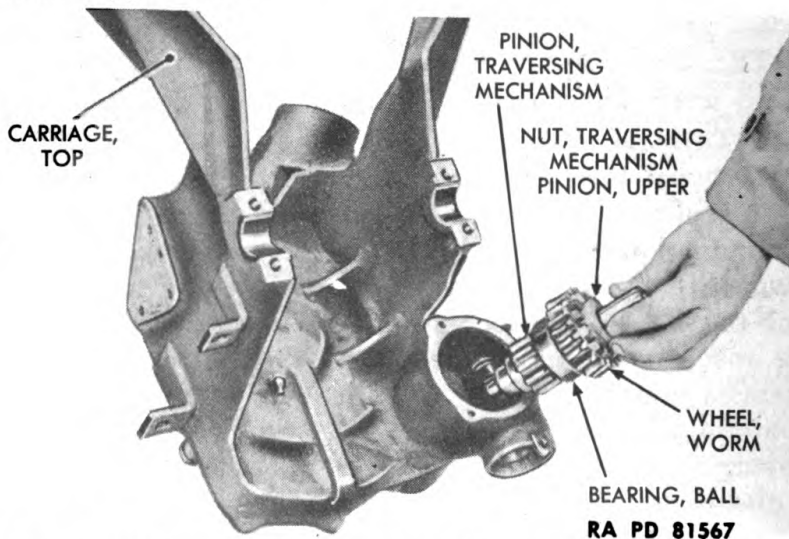


Figure 100 — Removing the Traversing Mechanism Pinion and Allied Parts

DISASSEMBLY AND ASSEMBLY

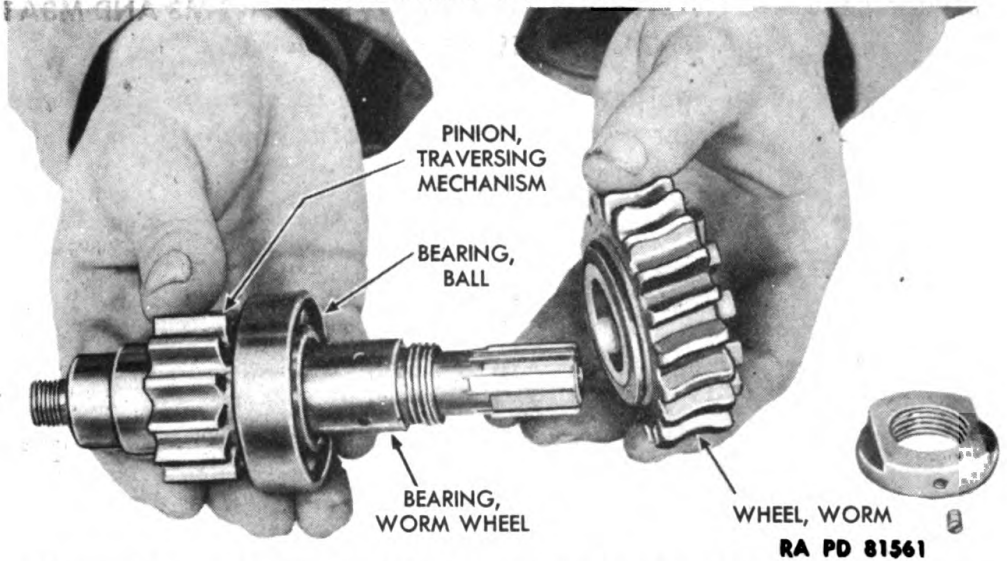


Figure 101 — Removing the Worm Wheel and Worm Wheel Bearing from the Traversing Mechanism Pinion

c. Assembling Traversing Mechanism (fig. 93).

(1) Replace the traversing gear box cover, traversing gear box cover gasket, and the oil retainer (fig. 97). Replace the traversing arc being sure to aline the assembly marks on the arc with those on the pintle support (fig. 96). Replace the upper pintle housing washer.

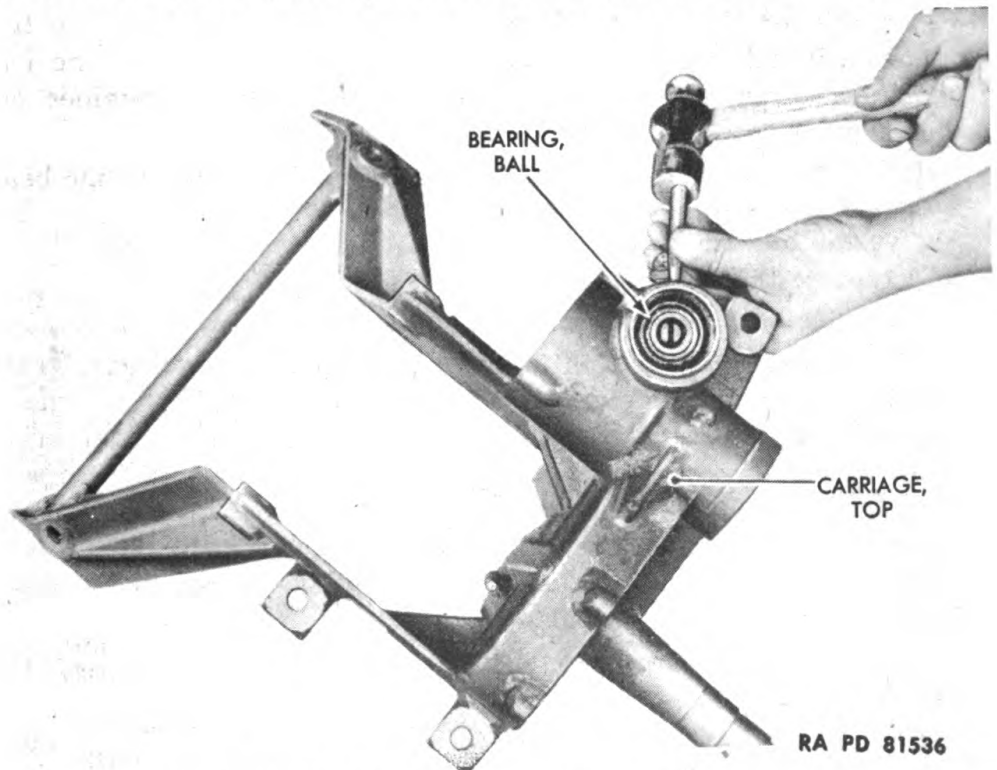


Figure 102 — Removing the Rear Ball Bearing

**ORDNANCE MAINTENANCE — 37-MM ANTITANK GUNS M3 AND M3A1
AND CARRIAGES M4 AND M4A1**

(2) Assemble the ball bearings and the race, and tap the assembly in toward the rear of the traversing worm housing. Tap the rear oil retainer into the rear of the housing.

(3) Assemble the upper ball bearing, the worm wheel bearing, and the worm wheel to the traversing mechanism pinion (fig. 101). Screw on the upper traversing mechanism pinion nut and then screw in its set screw. Replace the assembled traversing mechanism pinion and its allied parts in the top of the traversing mechanism housing (fig. 100). Then place the lower ball bearing in its seat in the bottom of the traversing mechanism housing. Replace the traversing worm in the traversing worm housing. Screw the assembled ball bearing and the worm bearing retainer into the worm housing. Replace the ball bearing retainer lock screw. Temporarily insert the traversing mechanism clutch in the top of the pinion housing to lock the pinion and assemble the lower traversing mechanism pinion nut to the traversing mechanism pinion tightening it just enough to allow the pinion to move freely. Stake the pinion nut. Replace the lower traversing mechanism cap (fig. 99). Put the set screw in place in the lower cap and tighten it.

(4) Turn the traversing gear box cover so that its indentation is approximately over the pintle support and lift the top carriage onto the support letting the pinion housing down into the indentation in the gear box cover.

NOTE: Be sure there is sufficient grease packed around the traversing arc and gear box cover.

(5) Replace the traversing arc stop screw and the nine cap screws along with their lock washers. Replace the lower pintle housing washer and the pintle nut washer. Replace the pintle nut. Tighten and replace the cotter pin in the nut (fig. 94).

(6) Replace the elevating controls support (par. 16 d).

(7) Place the controls bracket bushing in the controls bracket housing. Screw in the controls bracket ring and lock it with the machine screw. Slide the traversing shaft through the controls bracket housing. Place the traversing knob on the traversing shaft and secure it with its nut. Couple the traversing shaft flexible joint, and controls bracket housing to the elevating controls support with the cap screw washer and jam nut (fig. 73). Replace the cotter pin in the flexible joint.

(8) Assemble the traversing (quick release) mechanism (sub-par. d below).

(9) Replace the recoil mechanism, sleigh, tube, telescope mount, and shield (par. 13 d).

(10) Replace the elevating gear case (par. 16 d (1)).

RA PD 81578



- 83

**ORDNANCE MAINTENANCE — 37-MM ANTITANK GUNS M3 AND M3A1
AND CARRIAGES M4 AND M4A1****d. Assembling Traversing (Quick Release) Mechanism (fig. 90).**

(1) Replace the traversing mechanism clutch, traversing mechanism upper cap, and the traversing mechanism spring in the traversing mechanism pinion housing (fig. 92). Replace the traversing mechanism cover with the lubrication fitting toward the front and secure it in place with the three lock washers and cap screws (fig. 91).

(2) Screw the traversing mechanism lever rod to the rod end yoke and tighten the hexagonal nut (fig. 72). Replace the rod end yoke on the traversing mechanism lever and replace the rod end pin and cotter pin. Attach the traversing mechanism lever to the traversing mechanism cover by replacing the headless pin and cotter pin.

18. TOP CARRIAGE.

a. The top carriage is removed and disassembled as part of the operation of removing and disassembling the traversing mechanism (par. 17).

19. TRAILS.**a. Removal (fig. 103).**

(1) Elevate the gun to about 5 degrees. Unlock the trail lock and spread the trails. Lift the trails off the ground and place a prop beneath the muzzle of the gun. Put a block under one trail to keep this relationship. Remove the cotter pin from the trail hinge pin nut and remove the nut and lower washer. Remove the trail hinge pin, being careful not to damage the bronze pintle support bushings (some carriages of earlier manufacture are still equipped with needle bearings instead of bronze bushings) and remove the trail from the pintle support (fig. 104). Remove the upper washer.

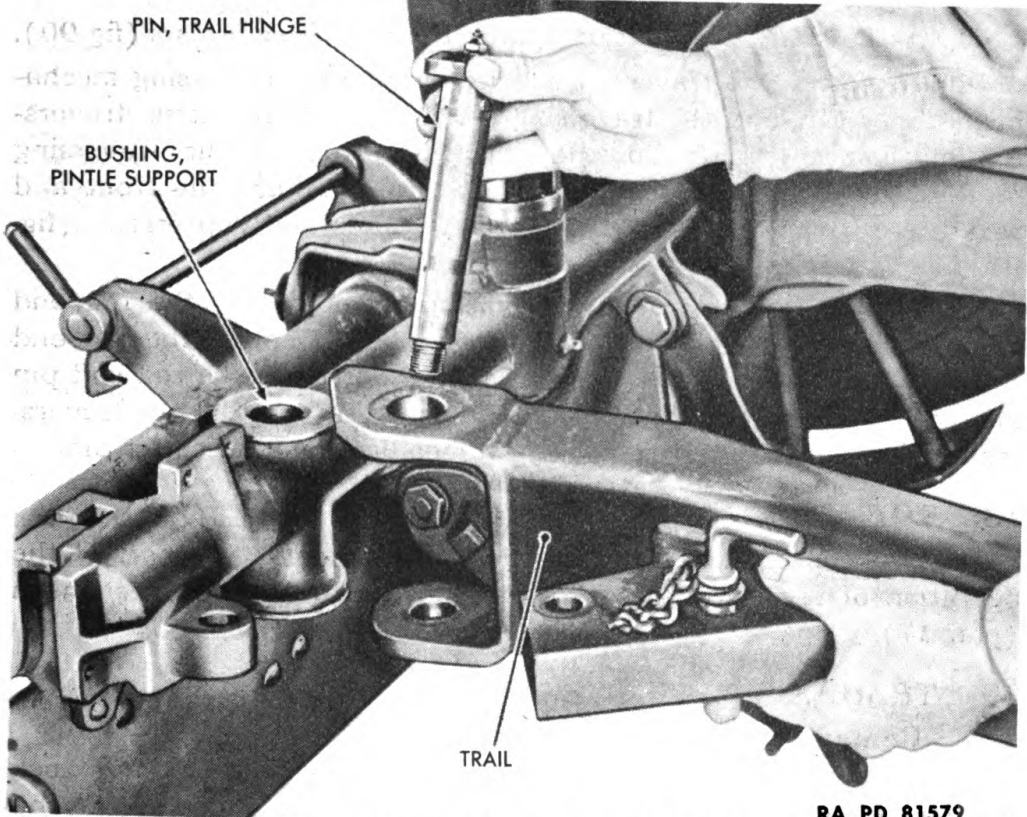
(2) Remove the other trail in a similar manner.

NOTE: It is not necessary to prop the trails when removing them from a carriage that has been stripped. Remove the trail hinge pin nut and trail hinge pin and slide the trail from the pintle support.

b. Disassembly (figs. 105 and 106).

(1) **TRAIL LOCK LATCH.** Unscrew the trail lock lever latch guide from the trail latch housing on the right trail. Withdraw the trail lock lever latch guide and assembled parts as a unit (fig. 107). Place the guide and allied parts in a copper jawed vise. Drive out the peened pin holding the trail lock lever latch cam to the trail lock lever latch plunger. The trail lock lever latch cam, trail lock lever latch collar, trail lock lever latch washer, trail lock lever latch plunger and trail lock lever latch spring will then come away. Remove the trail latch housing by taking out the two screws and washers holding it to the trail.

DISASSEMBLY AND ASSEMBLY



RA PD 81579

Figure 104 — Removing the Trail

(2) **TRAIL LOCK.** Remove the cotter pins from the two rod end pins that hold the trail lock lever and the trail lock hook to the right trail (fig. 108). Remove the rod end pins so releasing the trail lock lever and hook. Remove the cotter pins and the headless pin holding the trail lock lever to the hook. Remove the cotter pins and withdraw the headless pin that holds the trail lock connection and trail lock loop on the left trail. Loosen the jam nut on the trail lock connection and unscrew the connection from the loop.

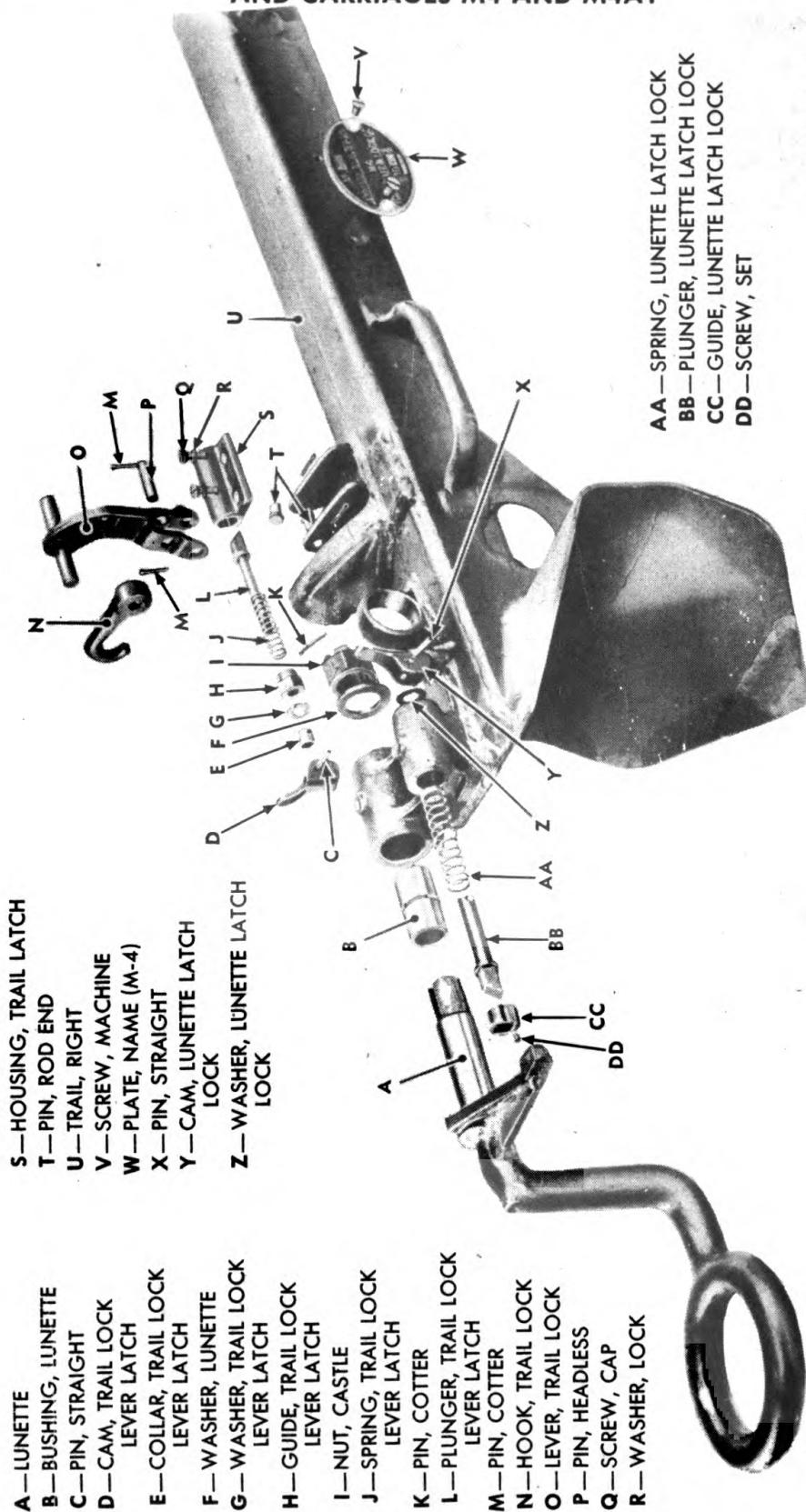
(3) **LUNETTE.** Remove the cotter pin and large castle nut that fastens the lunette to the right trail (fig. 105). Withdraw the lunette washer. Draw the lunette off the trail. Remove the lunette bushing from the trail.

(4) **LUNETTE LATCH LOCK.** Drive out the straight pin at the front of the lunette latch lock cam and lunette latch lock plunger (fig. 109). Remove the lunette latch lock cam and lunette latch lock washer. Remove the set screw from the face of the lunette latch lock guide that holds the lunette latch lock plunger in place. Unscrew the guide. Then remove the plunger and lunette latch lock spring.

c. Assembly.

(1) **LUNETTE LATCH.** Insert the lunette latch lock plunger and lunette latch lock spring into the latch housing on the right trail. Screw

ORDNANCE MAINTENANCE — 37-MM ANTITANK GUNS M3 AND M3A1
AND CARRIAGES M4 AND M4A1



RA PD 81545

Figure 105 — Trail Lock and Lunette Group Parts

DISASSEMBLY AND ASSEMBLY

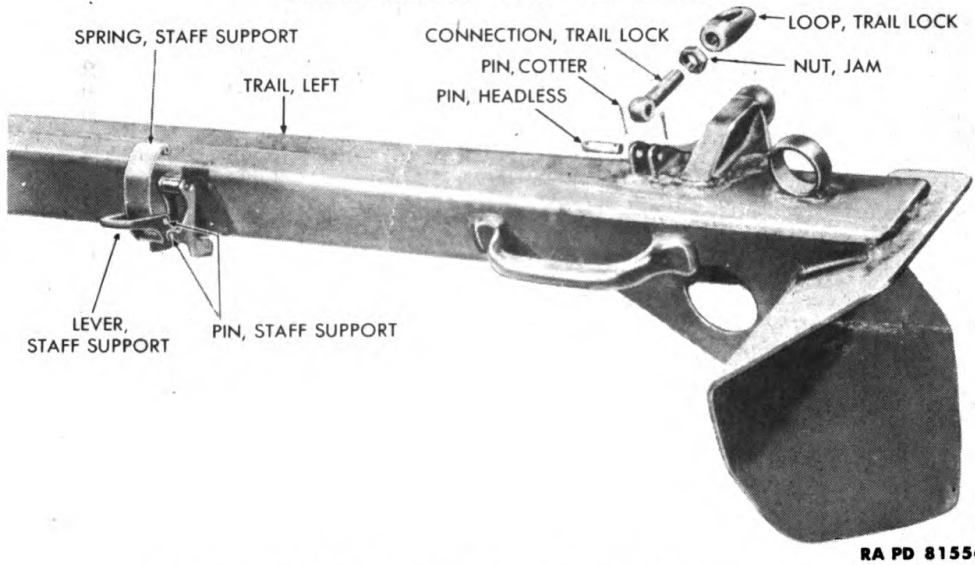
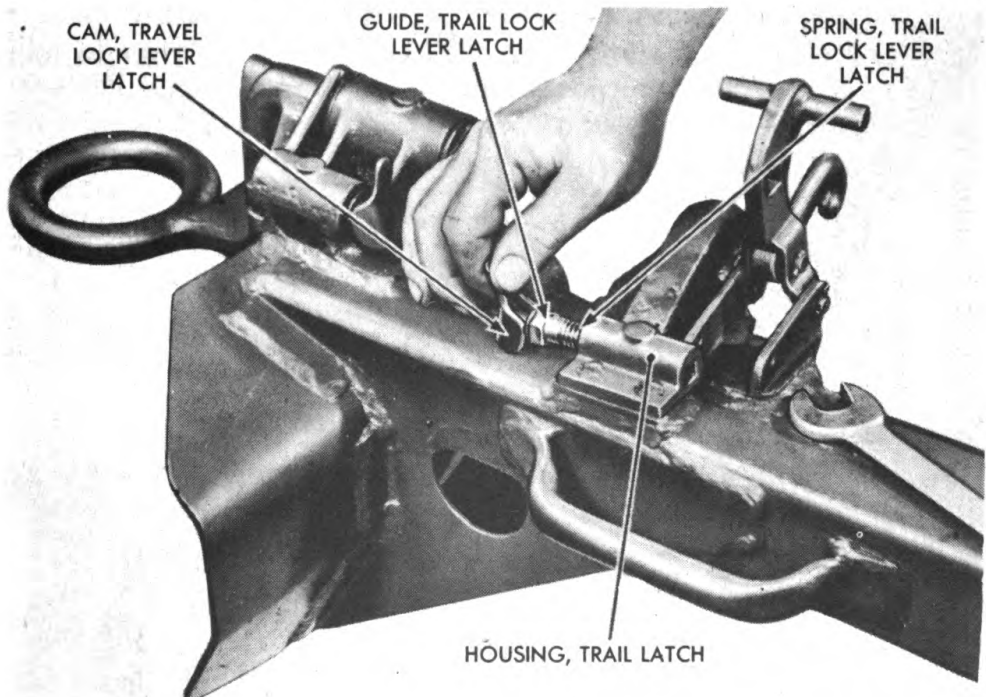


Figure 106 – Left Trail and Lock Group Parts

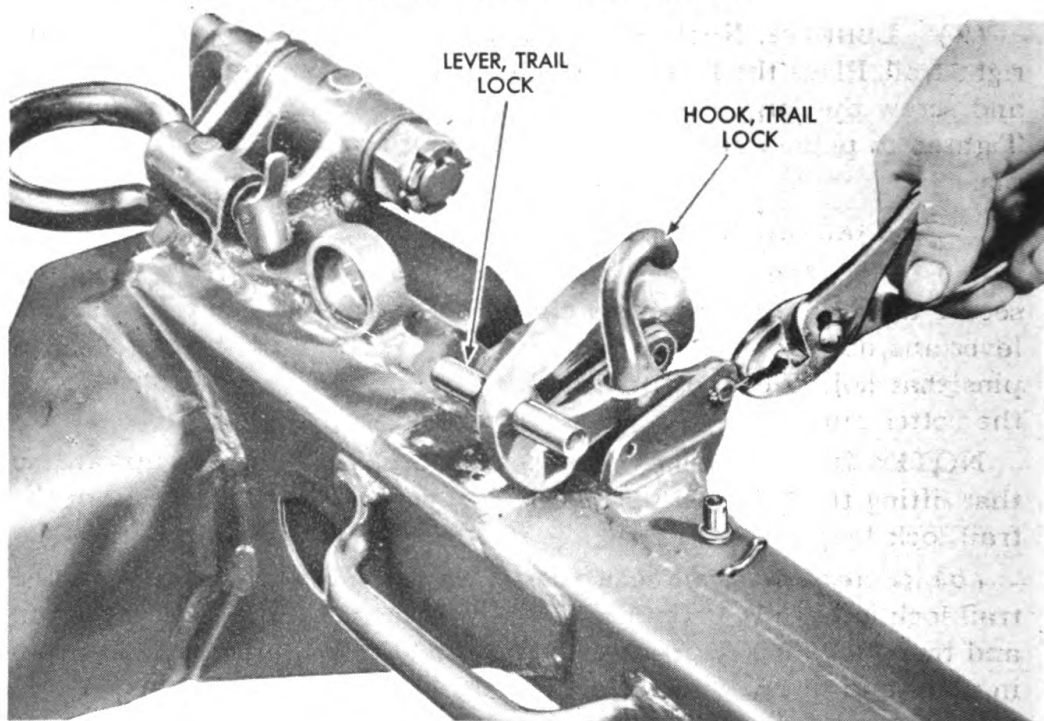
in the lunette latch lock guide that holds the plunger in place and screw the set screw into place on the right rear face of the guide. Put the lunette latch lock washer and lunette latch lock cam in place at the front of the lunette latch lock plunger. Insert the straight pin into the holes in the cam and plunger and stake the pin (fig. 109).



RA PD 81535

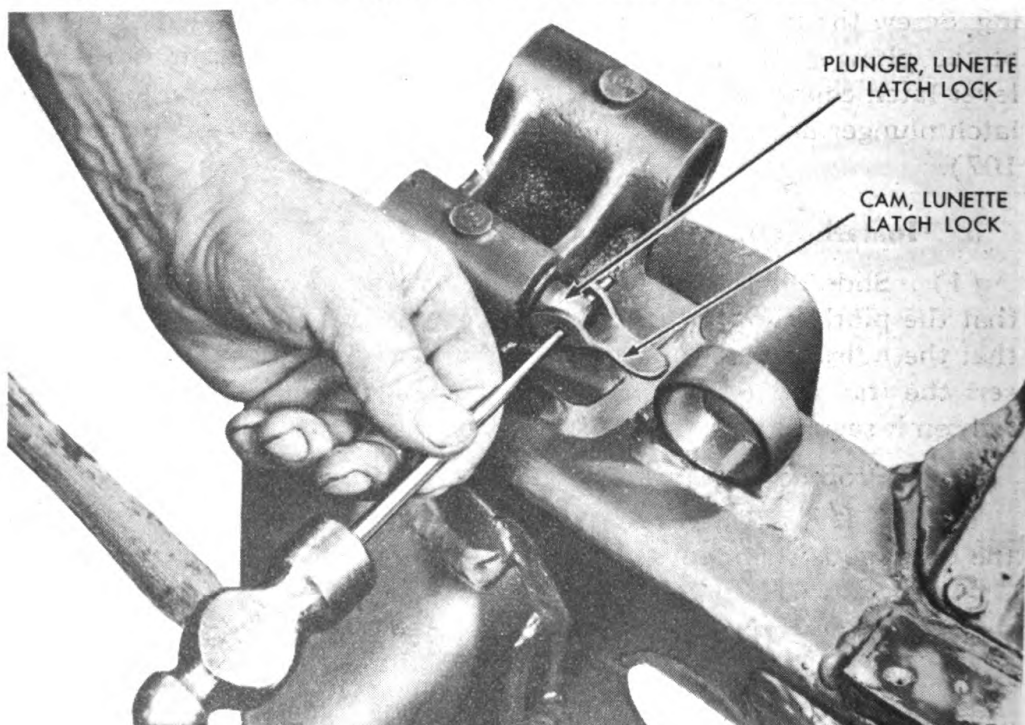
Figure 107 – Removing the Trail Lock Lever Latch Guide and Allied Parts

**ORDNANCE MAINTENANCE — 37-MM ANTITANK GUNS M3 AND M3A1
AND CARRIAGES M4 AND M4A1**



RA PD 81524

Figure 108 — Removing the Trail Lock Lever and Trail Lock Hook



RA PD 81521

Figure 109 — Removing the Lunette Latch Lock Cam

DISASSEMBLY AND ASSEMBLY

(2) **LUNETTE.** Replace the lunette bushing in the housing on the right trail. Place the lunette in the housing. Put on the lunette washer and screw the large castle nut onto the threaded end of the lunette. Tighten to point where lunette will still turn and safety with a cotter pin.

(3) TRAIL LOCK.

(a) Place the trail lock hook in position in the trail lock lever and secure them with the headless pin and cotter pins. Place the trail lock lever and hook in position on the right trail and insert the two rod end pins that hold them to the trail (fig. 108). Lock them in place with the cotter pins.

NOTE: On late models the hook is turned so it hooks upward so that lifting the trail lock lever causes the hook to disengage from the trail lock loop.

(b) Screw the trail lock connection with the jam nut into the trail lock loop and tighten the jam nut. Place the trail lock connection and trail lock loop in position on the left trail. Place the headless pin in place and safety with the cotter pins.

(4) **TRAIL LOCK LATCH.** Replace the trail latch housing on the right trail with its two screws and washers. Replace the trail lock lever latch plunger and trail lock lever latch spring in the trail latch housing. Screw the latch guide firmly into place on the threaded extension of the plunger. Replace the trail lock lever latch washer, trail lock lever latch collar, and trail lock lever latch cam on the trail lock lever latch plunger and replace the pin holding the cam to the plunger (fig. 107).

d. Installation.

(1) Slide the trail into position on the pintle support making sure that the pintle support bronze bushings and washers are in place and that the holes in the trail and pintle support are alined (fig. 104). Insert the trail hinge pin, place the trail hinge pin nut in position and tighten it securely. Then put in the cotter pin.

(2) Prop up the trail and replace the other trail.

NOTE: It is not necessary to prop the trails up in assembling when the carriage is stripped.

20. WHEEL, HUB, AND TIRE.

a. **Removal.** Swing the wheel segments down to jack up the wheels. Unscrew the hub cap. Remove the cotter pin and axle nut. Remove the outer wheel bearing washer and the small taper roller bearing cone and roller from the axle (fig. 110). Pull the hub and wheel from the axle.

ORDNANCE MAINTENANCE — 37-MM ANTITANK GUNS M3 AND M3A1 AND CARRIAGES M4 AND M4A1

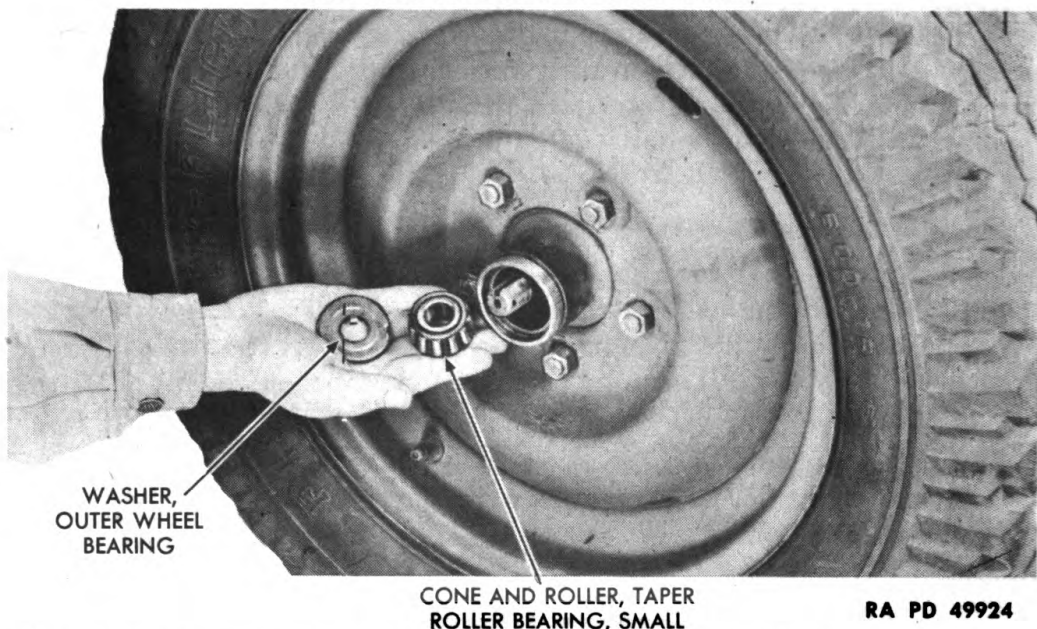


Figure 110 — Removing the Outer Wheel Bearing Washer and the Small Taper Roller Bearing Cone and Roller

h. Disassembly (figs. 111 and 112).

(1) With the outside of the wheel down, drive out the small taper roller bearing cup from the hub, tapping gently and evenly to prevent damage (fig. 113).

(2) With the inside of the wheel down, drive out the large taper roller bearing cup, tapping gently and evenly to prevent damage. The large taper roller bearing cone and roller and the oil retainer will also come away.

(3) Remove the wheel stud nuts that hold the wheel disk to the hub and remove the disk.

CAUTION: The right wheel has left-hand threads and the left wheel has right-hand threads.

(4) Deflate the tire.

CAUTION: This must be done before removing the wheel disk nuts because all the air pressure in the tire is acting against the wheel disk that is held down only by the nuts. Serious injury can result if this practice is not followed.

(5) Remove the wheel disk nuts. Then insert a spoon iron between the tire and the wheel disk and, holding it flat, hammer it inward so it follows the disk and does not bite into the bead. Move it around the tire carefully working the bead loose from the disk. If necessary, "stack up the irons"; that is, place one iron over the other between the bead and the disk. This will help give a bigger "bite" and more leverage in getting the bead away from the wheel disk.

DISASSEMBLY AND ASSEMBLY

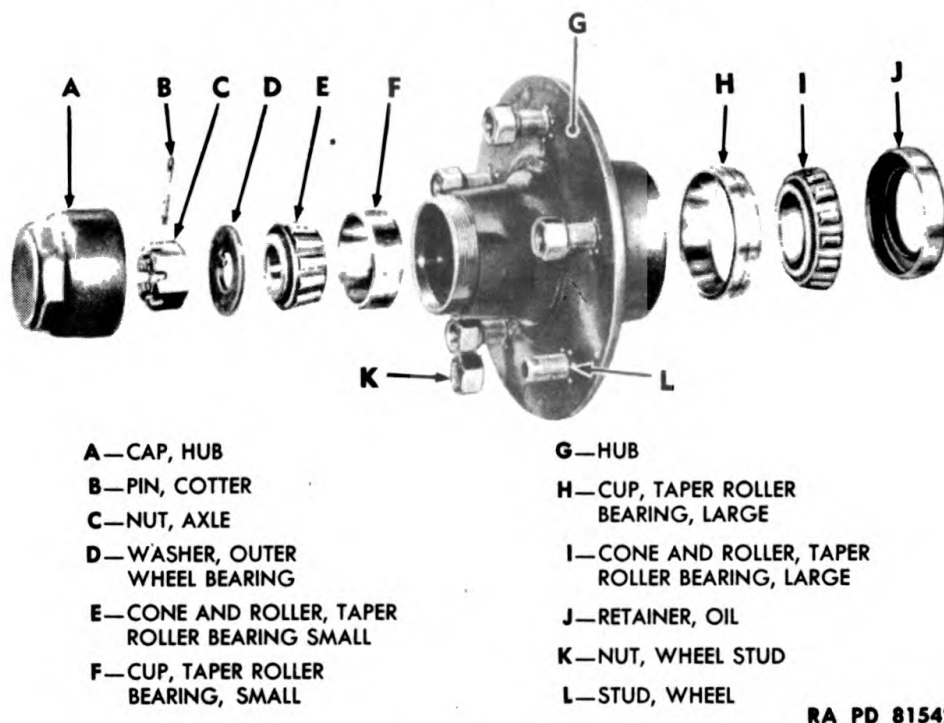


Figure 111 — Hub Group Parts

CAUTION: This should not be done until you have already worked one spoon once around the disk.

The wheel disk may now be lifted out of the tire.

(6) Turn the wheel over and pry out the wheel disk ring in a similar manner starting on the side opposite the valve (fig. 114). Forcing it out on the valve side will tear the valve from the tube. While prying upward on the wheel disk ring, rap the bead squarely wherever it binds, taking care not to bruise it. In this way, the bead will be knocked over the flange of the wheel disk ring.

(7) Push the wheel disk beadlock ring in at the valve. Pry it out of the tire with spoon irons at the side opposite the valve.

(8) Grasp the tube (not the valve stem) to remove it.

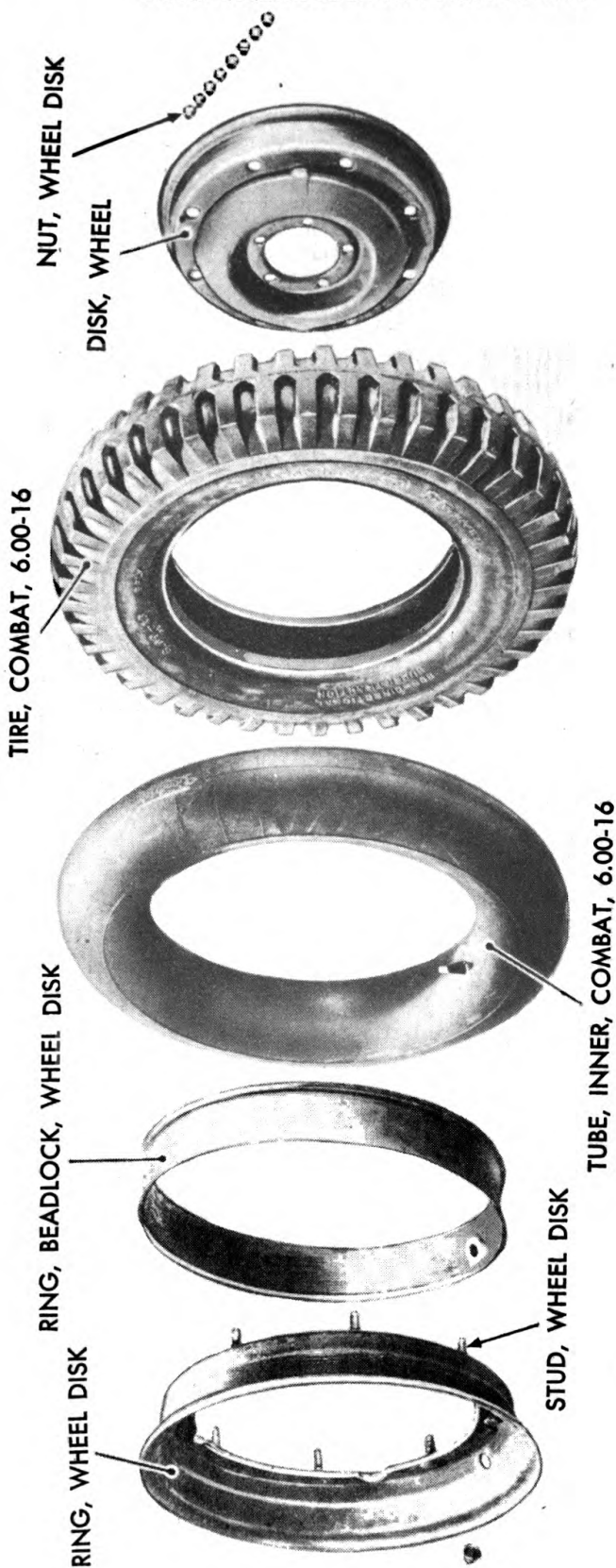
c. Assembly.

(1) Put the tire on a spreader or run a hand around the inside to remove all dirt and pebbles and to examine the tire itself for tears or roughness. Report any tire damage to the tire detail of the organization.

NOTE: Tubes that have been in service long enough to have become stretched, wrinkle when they are returned to the tire and should be replaced.

(2) Replace the tube in the tire. Carefully aline the valve stem with the hole in the wheel disk beadlock ring and start working the beadlock ring back into the tire. The beadlock ring is always to be

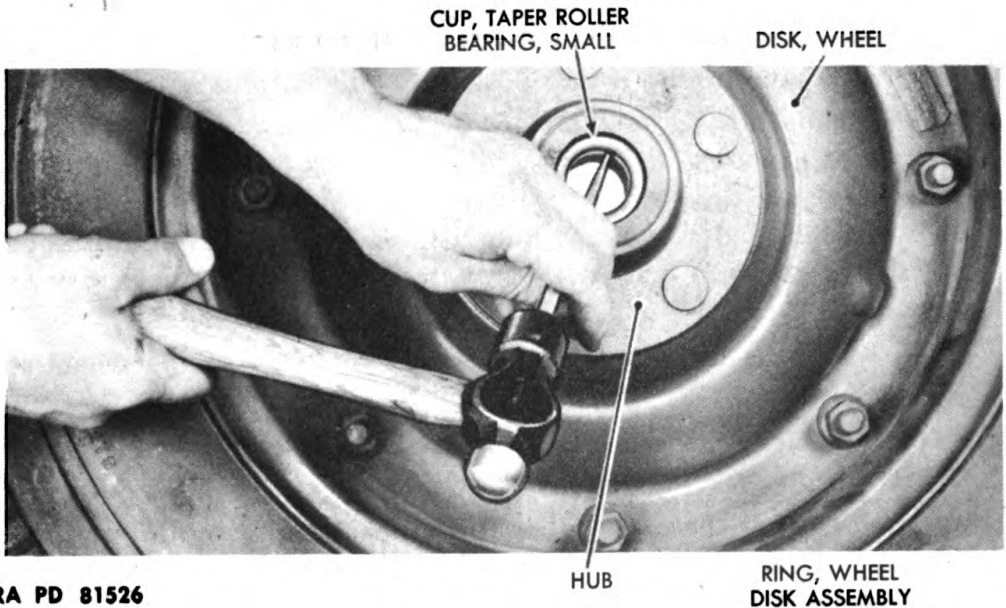
ORDNANCE MAINTENANCE — 37-MM ANTITANK GUNS M3 AND M3A1
AND CARRIAGES M4 AND M4A1



RA PD 81550

Figure 112 — Combat Wheel Group Parts

DISASSEMBLY AND ASSEMBLY



RA PD 81526

Figure 113 — Driving Out the Small Taper Roller Bearing Cup

placed *between the beads*. Round out the tube with a little air. This helps to hold the valve in place and keep the tube from getting pinched.

(3) Insert the wheel disk ring, making sure that it lines up exactly with the wheel disk beadlock ring at the valve stem. Work around the



RA PD 81533

Figure 114 — Removing the Wheel Disk

**ORDNANCE MAINTENANCE — 37-MM ANTITANK GUNS M3 AND M3A1
AND CARRIAGES M4 AND M4A1**

wheel disk ring forcing it into position, being careful not to get it out of alinement with the beadlock ring.

(4) Replace the wheel disk, matching the lock in the wheel disk with the slot in the wheel disk ring assembly. This will line up the holes in which the wheel disk nuts will go. Finger-tighten all the nuts, and then tighten in turn with the wrench until the wheel disk is in place.

(5) Put the hub on the disk wheel and replace the wheel stud nuts.

(6) Replace the small taper roller bearing cup by driving it into position in the outside of the hub.

(7) Replace the large taper roller bearing cup by driving it into position in the inside of the hub. Place the large taper roller bearing cone and roller in the hub and drive in the oil retainer.

NOTE: Wheel bearings must be carefully lubricated in accordance with instructions in paragraph 48 g (4).

d. **Installation.** Slide the hub and wheel assembly onto the wheel spindle. Replace the small taper roller bearing cone and roller and the outer wheel bearing washer (fig. 110). Replace and tighten the axle nut until the bearings are tight and the wheel cannot be shaken sideways but rotates freely. Then install the cotter pin and screw on the hub cap.

21. WHEEL SEGMENT AND SEGMENT LATCH.

a. **Disassembly** (fig. 115).

(1) **WHEEL SEGMENT.** Jack up the carriage. Lower the wheel segment and remove the wheel and hub (par. 20 a).

(2) Tap the taper pin (fig. 116) from the back of the axle collar and tap the collar (fig. 117) off the axle. Then tap the wheel segment off the axle (fig. 118).

(3) **SEGMENT LATCH.** Remove the cotter pin and washer from the hinge pin holding the segment locking plunger handle to the segment locking plunger. Remove the hinge pin. Remove the segment locking plunger and segment locking plunger spring from the bracket on the axle (fig. 119). Remove the cotter pin and washer from the rod end pin that secures the segment locking plunger handle to the axle bracket and remove the rod end pin. Remove the segment locking plunger handle.

b. **Assembly.**

(1) **SEGMENT LATCH.** Assemble the segment locking plunger handle to the axle bracket with the rod end pin, washer, and cotter pin.

DISASSEMBLY AND ASSEMBLY

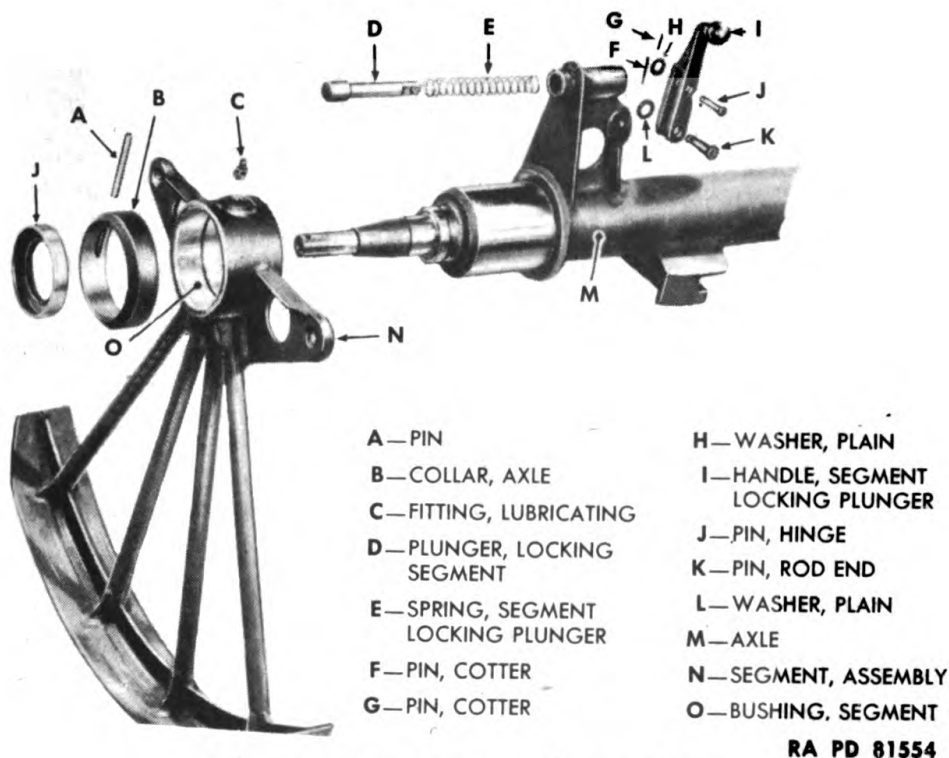
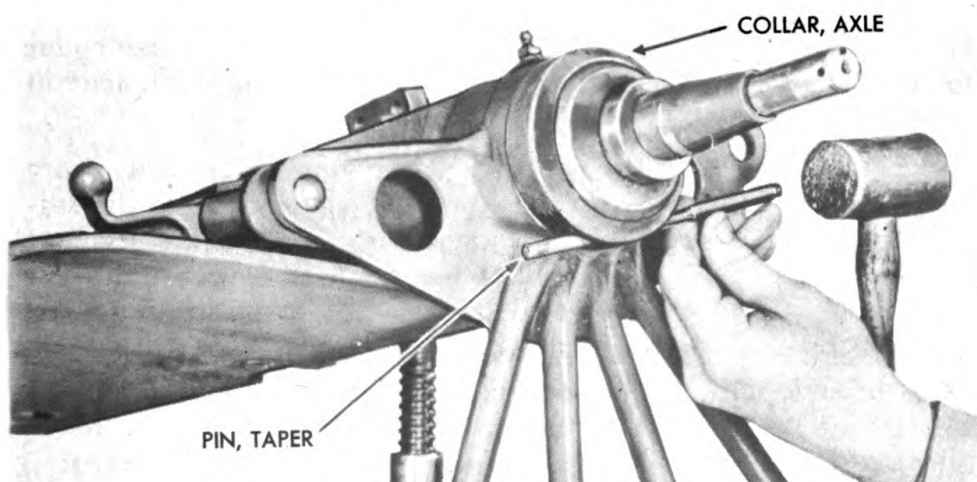


Figure 115 — Segment Group Parts

Place the segment locking plunger spring on the segment locking plunger and insert the assembly into the bracket on the axle. Secure the end of the plunger to the handle with the hinge pin, washer, and cotter pin (fig. 119).

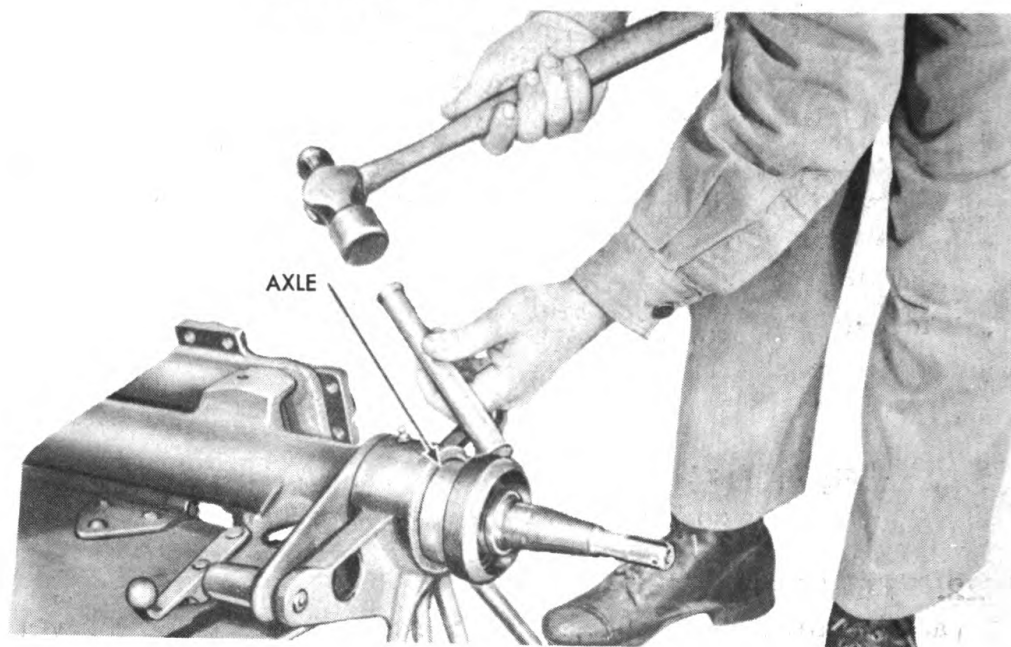
(2) **WHEEL SEGMENT.** Slide the wheel segment into position on the axle with the flange at the top of the segment toward the outside (fig. 118). Put the axle collar in place on the axle and lock it with the



RA PD 50029

Figure 116 — Removing the Taper Pin from the Axle Collar

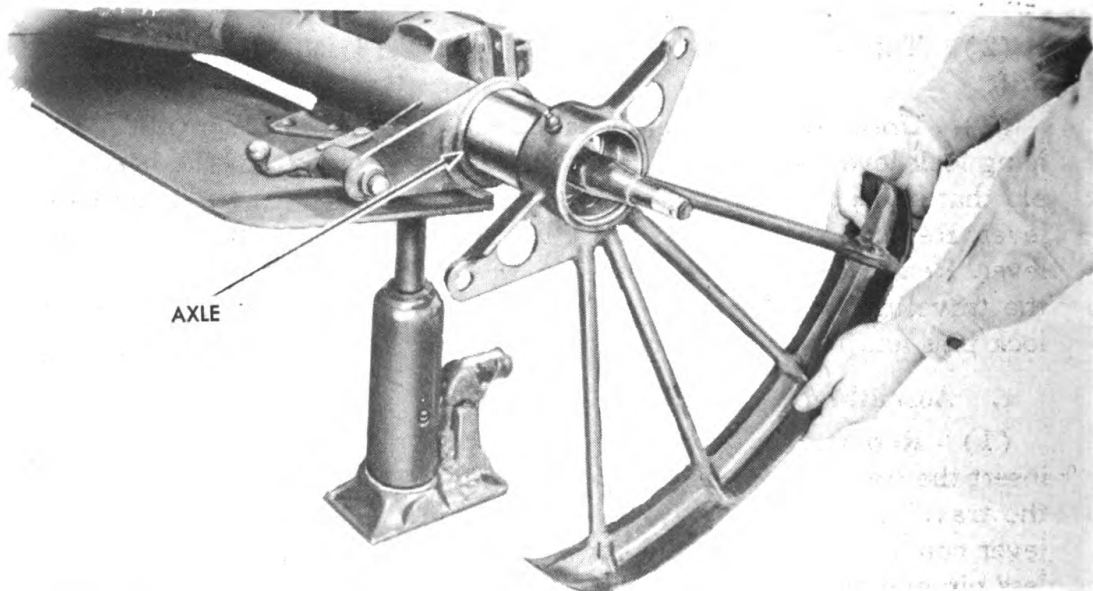
ORDNANCE MAINTENANCE — 37-MM ANTITANK GUNS M3 AND M3A1
AND CARRIAGES M4 AND M4A1



RA PD 50003

Figure 117 — Removing the Axle Collar

taper pin which must be driven from the front. Care must be taken in replacing the collar to line the pinholes up with the cut on the axle. Replace the wheel and hub (par. 20 d). Remove the jack from under the carriage.



RA PD 81575

Figure 118 — Removing the Wheel Segment

DISASSEMBLY AND ASSEMBLY

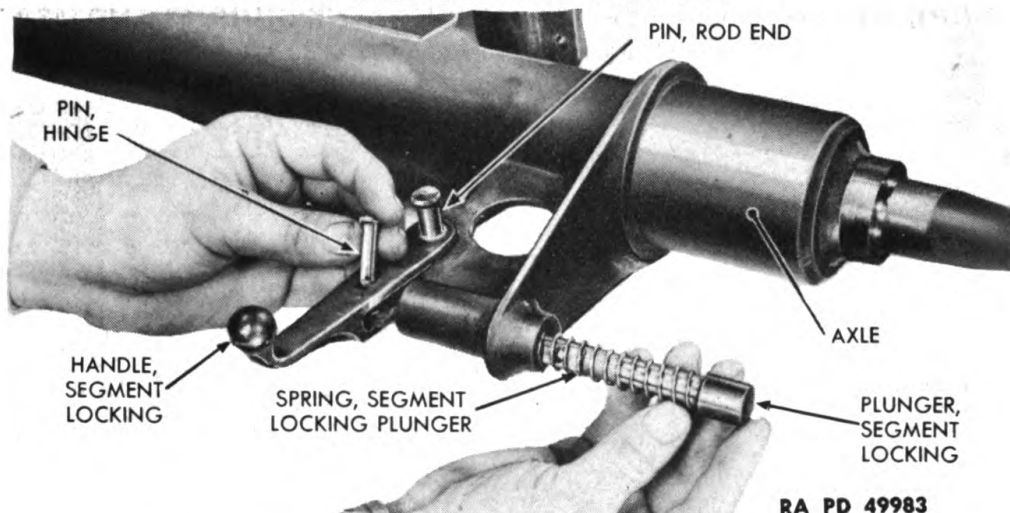


Figure 119 — Removing the Segment Locking Plunger and Segment Locking Plunger Spring

22. TRAVELING LOCK.

a. **Removal** (fig. 120). Unlock the traveling lock and allow it to swing down. Remove the cotter pins and traveling lock hinge pin nuts from the traveling lock hinge pins. Remove the hinge pins from the pintle support and lift off the traveling lock (fig. 121).

b. **Disassembly** (fig. 122).

(1) Remove the straight pin from the traveling lock lever plunger knob and remove the knob. Unscrew the traveling lock lever plunger guide. The traveling lock lever plunger spring will come out as the guide is removed and the traveling lock lever plunger may then be removed.

(2) Tap out the traveling lock hinge pin bushings with a brass drift.

(3) Unscrew the traveling lock loop and jam nut from the traveling lock lever connection. Remove the cotter pins from the headless pin that holds the traveling lock lever connection to the traveling lock lever. Remove the headless pin and remove the connection from the lever. Remove the cotter pins from the traveling lock pins that hold the traveling lock lever to the traveling lock. Remove the traveling lock pins and remove the traveling lock lever from the traveling lock.

c. **Assembly.**

(1) Replace the traveling lock lever on the traveling lock and insert the traveling lock pins that secure it to the traveling lock. Secure the traveling lock pins with cotter pins. Assemble the traveling lock lever connection to the traveling lock lever and secure with the headless pin and cotter pins. Screw the jam nut and traveling lock loop on the connection and tighten securely.

ORDNANCE MAINTENANCE — 37-MM ANTITANK GUNS M3 AND M3A1
AND CARRIAGES M4 AND M4A1

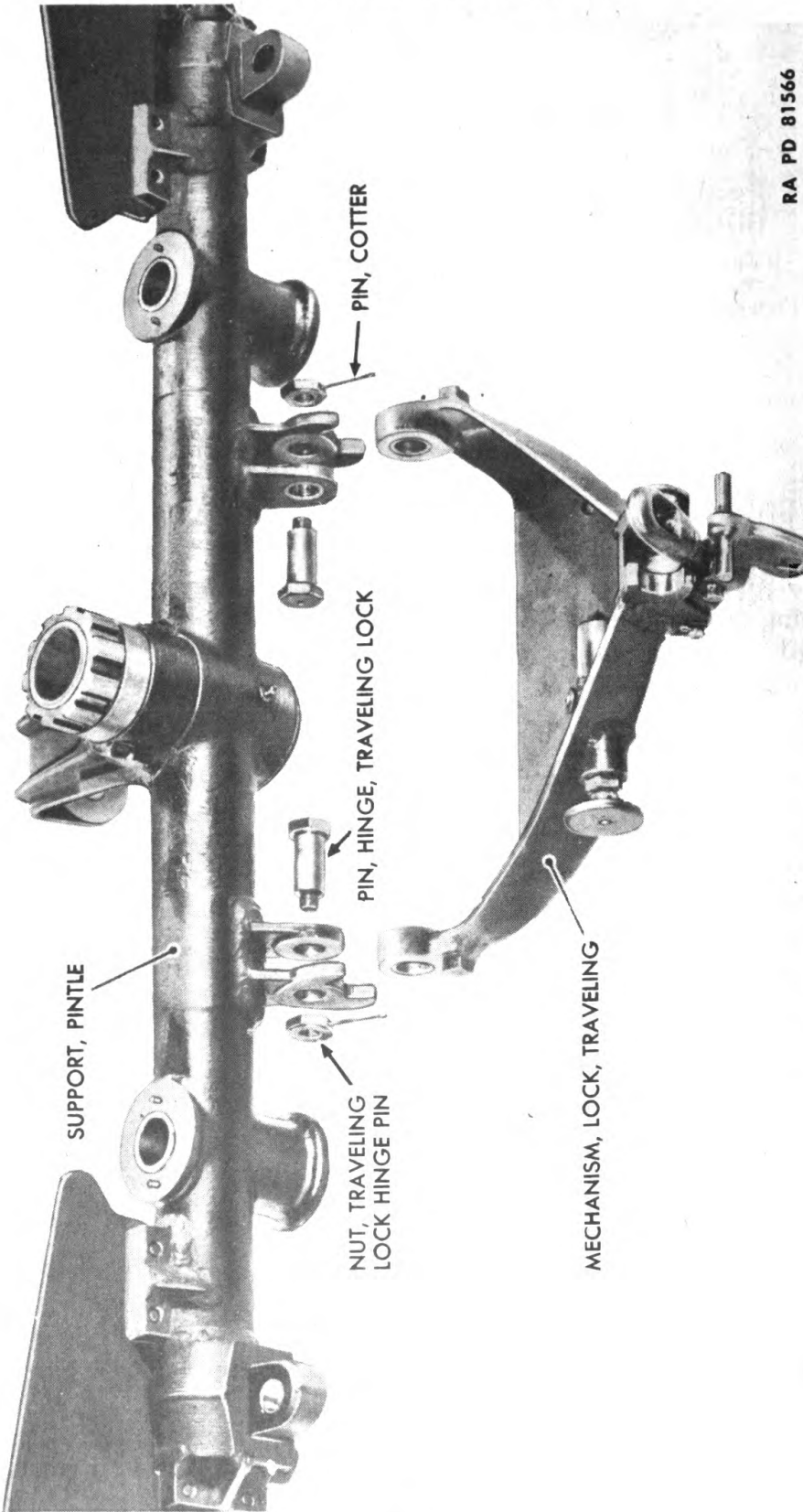


Figure 120 — Traveling Lock Hinge Group Parts

DISASSEMBLY AND ASSEMBLY

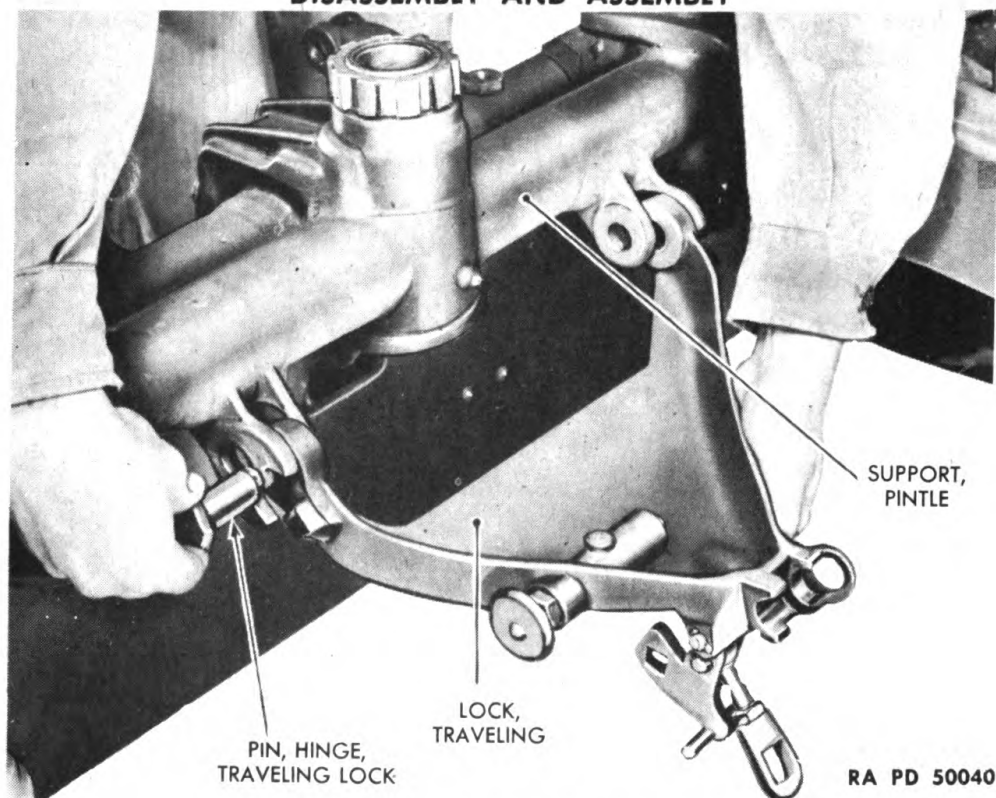


Figure 121 — Removing the Traveling Lock

(2) Replace the traveling lock lever plunger in the traveling lock. Replace the traveling lock lever plunger spring. Screw the traveling lock lever plunger guide into the traveling lock. Replace the traveling lock lever plunger knob on the traveling lock plunger. Replace the straight pin in the knob.

(3) Replace the hinge pin bushings by pressing them into the traveling lock.

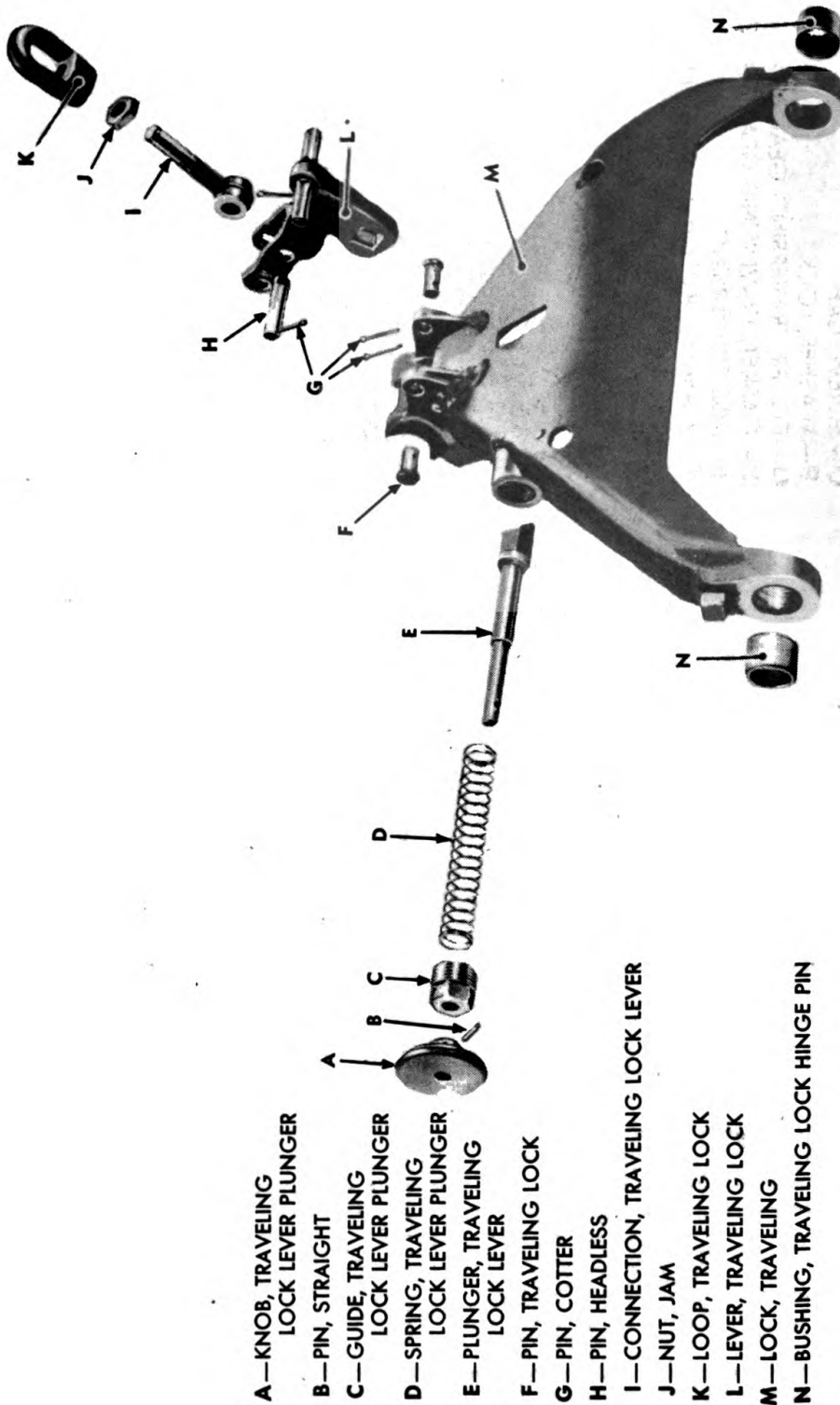
d. Installation. Assemble the traveling lock to the pintle support and secure it in position with the traveling lock hinge pins, traveling lock hinge pin nuts, and cotter pins. Adjust the traveling lock loop so that it clamps securely to the recoil cylinder when the gun is fully elevated, and tighten the jam nut.

23. AXLE AND PINTLE SUPPORT.

a. Disassembly (fig. 123).

- (1) Remove the tube (par. 9 a).
- (2) Remove the sleigh (par. 10 a).
- (3) Remove the elevating gear case (par. 16 a (4)).
- (4) Remove the cotter pin and pintle nut from below the pintle support (fig. 94). Remove the pintle nut washer and the lower pintle housing washer. Remove the traversing arc stop screw, the nine cap

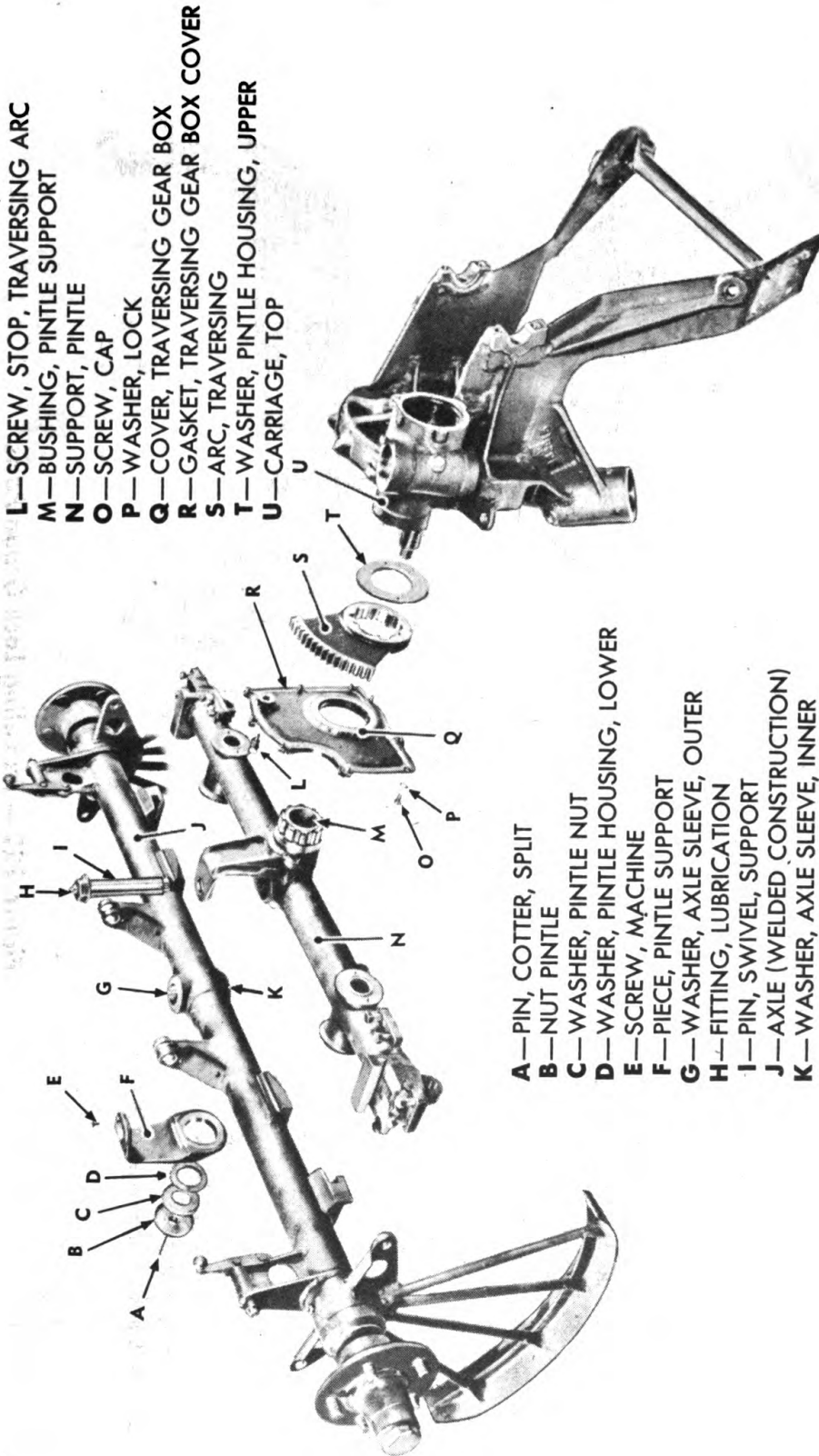
ORDNANCE MAINTENANCE — 37-MM ANTITANK GUNS M3 AND M3A1
AND CARRIAGES M4 AND M4A1



RA PD 81546

Figure 122 — Traveling Lock Group Parts

DISASSEMBLY AND ASSEMBLY



RA PD 81563

Figure 123 — Pintle Support — Exploded View

**ORDNANCE MAINTENANCE — 37-MM ANTITANK GUNS M3 AND M3A1
AND CARRIAGES M4 AND M4A1**

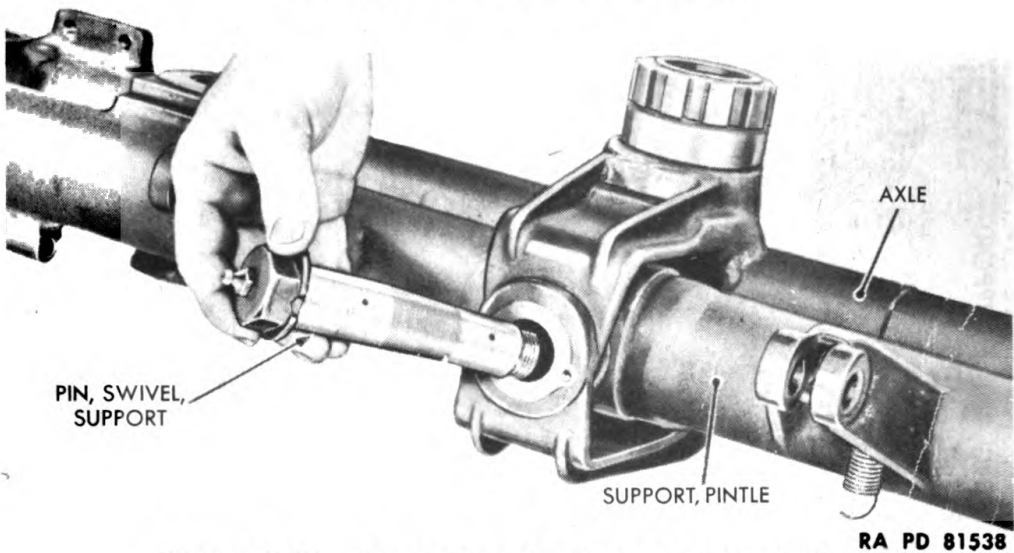


Figure 124 — Removing the Support Swivel Pin

screws, and the lock washers from the traversing arc. Swing the top carriage fully to the left and with a chain hoist lift off the top carriage and its assemblies. Remove the upper pintle housing washer. Place prick punch assembly marks on the traversing arc and on the pintle support. Then remove the traversing arm (fig. 96). Remove the traversing gear box cover and the traversing gear box cover gasket (fig. 97). Remove the oil retainer.

(5) Remove the apron, apron locking mechanism, and guards (par. 14 a).

(6) Remove the trails (par. 19 a).

(7) Remove the wheels (par. 20 a).

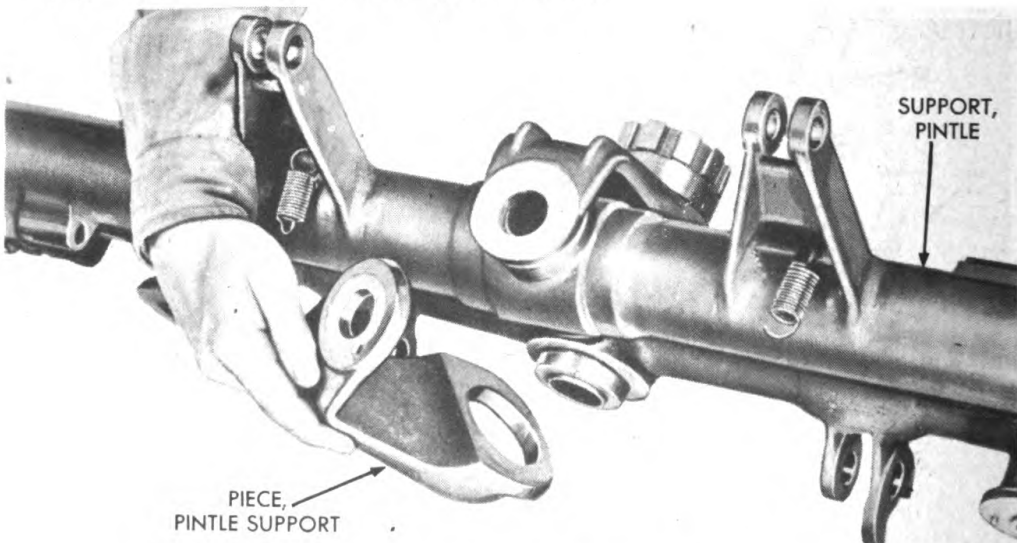
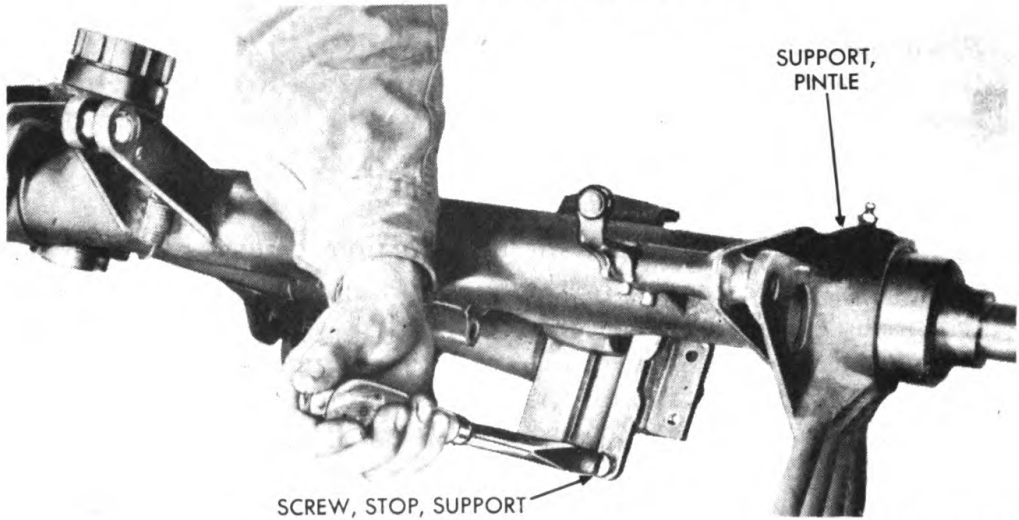


Figure 125 — Removing the Pintle Support Piece

DISASSEMBLY AND ASSEMBLY



RA PD 50034

Figure 126 — Removing the Support Stop Screw from the Pintle Support

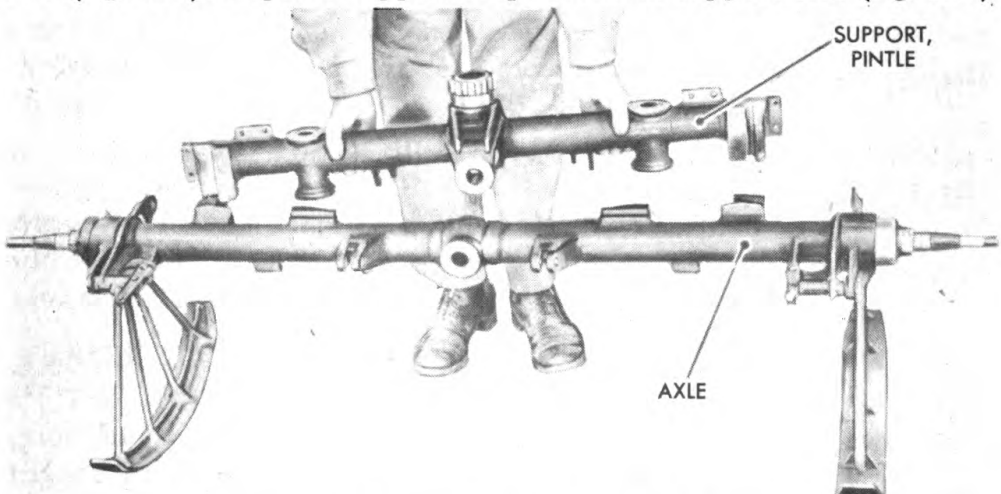
(8) Remove the machine screw that locks the support swivel pin and remove the pin (fig. 124). Remove the pintle support piece (fig. 125) from the axle and the pintle support. Remove the support stop screws at the ends of the pintle support (fig. 126) that keep the support ends from lifting out of the axle keyways. Then lift the pintle support up and out of the axle keyways (fig. 127). Remove the pintle support bushings by driving them out.

(9) Remove the wheel segments and segment latches (par. 21 a).

b. Assembly (fig. 123).

(1) Replace the wheel segments and segment latches (par. 21 b).

(2) Replace the pintle support bushings. Place the pintle support in the axle keyways with the center top bracket over the pintle pin hole (fig. 127). Replace support stop screws in support end (fig. 126).



RA PD 49991

Figure 127 — Removing the Pintle Support

**ORDNANCE MAINTENANCE — 37-MM ANTITANK GUNS M3 AND M3A1
AND CARRIAGES M4 AND M4A1**

Place the pintle support piece in position (fig. 125). Then screw in the support swivel pin and tighten it (fig. 124). Replace the machine screw that locks the support swivel pin.

(3) Replace the wheels.

(4) Replace the trails.

(5) Replace the apron, apron locking mechanism, and guards.

(6) Replace the oil retainer in the pintle support. Replace the traversing gear box cover and gear box cover gasket on the pintle support. Replace the traversing arc on the support, being sure to line up the assembly marks on the arc and support. Replace the upper pintle housing washer. With a chain hoist, lift the top carriage and its assemblies into place on the pintle support. Replace the nine cap screws and washers and the traversing stop screw. Replace the lower pintle housing washer, the pintle nut washer, and the pintle nut on the bottom of the pintle support, and lock with the cotter pin (fig. 94).

(7) Replace the elevating gear case (par. 16 d).

(8) Replace the sleigh (par. 10 b).

(9) Replace the tube (par. 9 d).

Section III

INSPECTION INSTRUCTIONS

	Paragraph
General	24
Inspection report	25
Tools	26
Inspection prior to disassembly	27
Inspection after disassembly	28

24. GENERAL.

a. The purpose of inspection is to determine the condition of the materiel, whether repairs or adjustments are required, and the corrections necessary to insure that the materiel is serviceable.

b. Before proceeding with the inspection, clean and oil the gun and carriage properly. This is highly important, because some malfunctions may be caused by inadequate lubrication and the presence of dirt, grit, or other extraneous matter on surfaces or in the recesses of operating parts.

c. **Star Gaging.** The estimated average accuracy life, in full service rounds of high-explosive ammunition, of the 37-mm Guns M3 and M3A1 is 3,900 rounds. Accuracy life is greatly shortened when armor-piercing shot is also used. One round of armor-piercing shot is equivalent (in gun wear) to 10 rounds of high-explosive shell. The guns in service should be star-gaged at approximately 10 percent and 90 percent of their estimated accuracy life in rounds fired and, thereafter, at 10 percent during the remainder of their service. Also, they should be star-gaged at any time an inspector may deem it necessary due to doubtful conditions or when the bore shows signs of unusual wear or other irregularities. Decoppering of the bore before star-gaging is prohibited. When the gun is being star-gaged, the greatest distance from the muzzle at which star-gage measurements are to be made is 68.45 inches.

d. **Impressions.** For pastilles, or other defects of the bore of the gun which require **PLASTER OF PARIS** or **GUTTA PERCHA** impressions for measurement purposes, **PLASTER OF PARIS** should be used, if practicable, since it provides a harder surface and a more accurate measurement than **GUTTA PERCHA**.

25. INSPECTION REPORT.

a. The administrative procedure to be followed relative to inspection and maintenance is contained in TM 9-1100, "Inspection of Ordnance Materiel."

b. All faulty operations and any defects of the materiel should be recorded on the inspection report O.O. F-7229.

ORDNANCE MAINTENANCE — 37-MM ANTITANK GUNS M3 AND M3A1
AND CARRIAGES M4 AND M4A1

26. TOOLS.

a. Tools for inspection include those used for disassembly and assembly (figs. 11 and 12).

b. Special tools needed for inspection include the bore sights, testing target, and tire gage.

(1) The bore sights consist of breech and muzzle bore which are used in the verification and adjustment of the telescope and telescope mount.

(2) The testing target is used in conjunction with the bore sights in the verification and adjustment of the telescope and telescope mount.

(3) The tire gage is used to check the tire air pressure.

27. INSPECTION PRIOR TO DISASSEMBLY.

Parts to be Inspected	Points to Observe
Gun as a unit.	General appearance. No missing or broken parts on exterior. Gun properly secured on carriage. Paint in good condition. All lubrication fittings painted red.
Tube.	Free from dirt, grit, and other abrasives. Dull, gray appearing bore. (A shiny bore indicates abrasives have been used.) Bore free of pits and excessive wear at the forcing cone. (Excessive wear indicates a worn out tube.)
Breech mechanism.	Free from dirt, grit, and other abrasives. No burs, scores, or excessive wear. Breechblock positively secured in the closed position. Breechblock operates easily and properly.
Firing mechanism.	Firing mechanism works easily and firing pin operates properly.
Sleigh and recoil mechanism.	Required amount of recoil oil. Slides clean and properly lubricated; no burs or scratches. No oil leaks around recoil cylinder head or piston packing housing follower.

INSPECTION INSTRUCTIONS

Parts to be Inspected	Points to Observe
	<p>Filling hole threads not burred; recoil cylinder head not rounded or threads stripped.</p> <p>Check reports on firing tests to see whether gun worked smoothly in recoil, that it recoiled the prescribed distance, and that it returned to battery without shock.</p>
Top carriage (elevating and traversing mechanisms).	<p>All parts clean and lubricated.</p> <p>No broken or cracked welds or parts.</p> <p>Traversing (quick release) mechanism operates properly.</p> <p>No binding or backlash in traversing or elevating controls.</p> <p>Traversing and elevating handwheels and shafts free of breaks, cracks, and rust.</p> <p>No leaks in oil retainers.</p> <p>Grease fittings installed on trunnion bearing caps and proper lubrication being applied to trunnion bearings.</p> <p>Top carriage operates freely without binding and without excessive lost motion.</p>
Apron, guards, and shield.	<p>In serviceable condition.</p> <p>Apron swings freely and locks properly.</p>
Bottom carriage (wheels, axle, wheel segments, trails, spades, etc.).	<p>Clean and properly lubricated.</p> <p>No broken or cracked welds.</p> <p>Wheel bearings properly adjusted. No drag or side play. (Only a slight movement or shake should be felt on the race of the outer wheel bearing.)</p> <p>Trails open and close easily without excessive play at hinge pins.</p> <p>Trail hinge pins properly lubricated and free of scores and wear.</p> <p>Traveling lock and latch in working order.</p> <p>Lunette tight and locks properly.</p> <p>Wheel segments not broken or bent, swing freely, and lock properly.</p>

**ORDNANCE MAINTENANCE — 37-MM ANTITANK GUNS M3 AND M3A1
AND CARRIAGES M4 AND M4A1**

Parts to be Inspected	Points to Observe
Wheels and tires.	Proper tire pressure. No uneven wear on tires. Valve stems straight.
Telescope mount.	Operates freely and without binding. Telescope locking nut securely locks telescope in place. Lugs and flanges for receiving telescope in good condition.
Telescope.	Lens not dirty, scratched, or broken. Telescope body not bent. Mounting lugs not broken.
Tools and accessories.	Tools and spare parts agree with allowance in SNL A-44. Gun book up to date.

28. INSPECTION AFTER DISASSEMBLY.

a. **General.** All parts, when disassembled, should be thoroughly cleaned with SOLVENT, dry-cleaning, to facilitate inspection of the parts. New lubricant should be applied as the parts are reassembled.

Parts to be Inspected	Points to Observe
Tube.	Tube locking nut threads clean and free from burs. Bore clean, and free from rust, pits, burs, and bruises (fig. 128).
Breech ring (fig. 129).	No nicks, scratches, burs, nor rust in breech recess. Operating handle, operating handle latch, operating handle latch spring, and operating handle catch in good condition. No rust, scores, nicks, or cracks on operating crank. No cracks or breaks on operating handle detent; tension good. No broken lips, cracks, or rust on extractors. Sear tripper free of burs and nicks.

INSPECTION INSTRUCTIONS

RA PD 81564

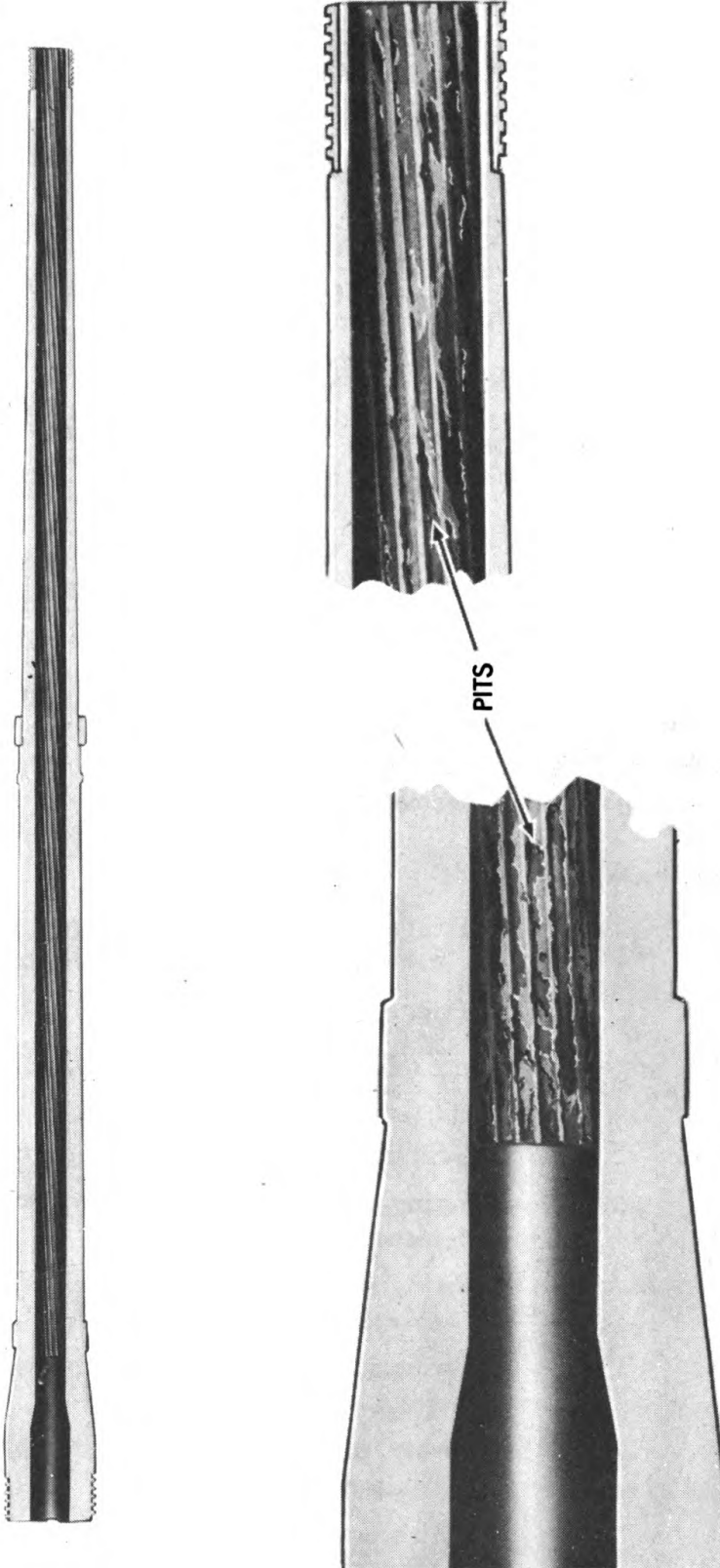


Figure 128 — Defects that Occur in the Tube

ORDNANCE MAINTENANCE — 37-MM ANTITANK GUNS M3 AND M3A1
AND CARRIAGES M4 AND M4A1

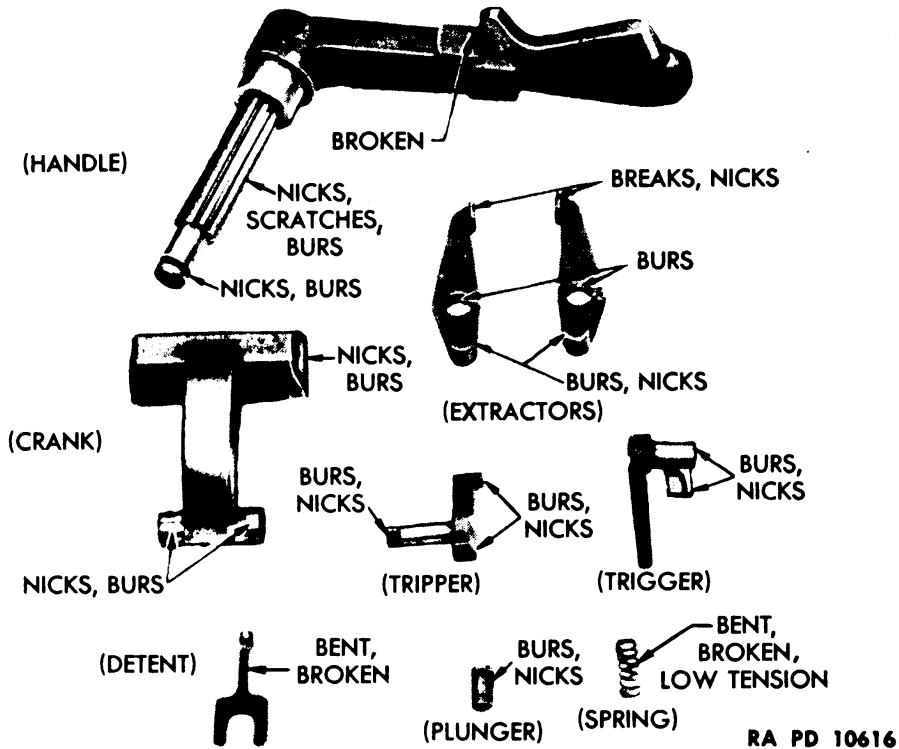


Figure 129 — Parts of the Breech Ring Showing Points to be Inspected and Possible Defects

Parts to be Inspected	Points to Observe
Breechblock (figs. 130 and 131).	<p>Trigger and trigger plunger free of cracks, nicks, burs, and breaks.</p> <p>Trigger plunger spring not bent or broken; tension good.</p> <p>Surfaces free of rust, scores, or burs.</p> <p>Sear not cracked, broken, or rough.</p> <p>Firing pin not broken, rusted, scored, or deformed.</p> <p>Firing pin cocking lever has no nicks, scratches, cracks, nor rust.</p> <p>Firing spring not broken or bent; tension good.</p> <p>Firing pin guide free of cracks, dents; seats properly in block.</p> <p>No breaks, cracks, or rust on firing spring stop.</p>

INSPECTION INSTRUCTIONS

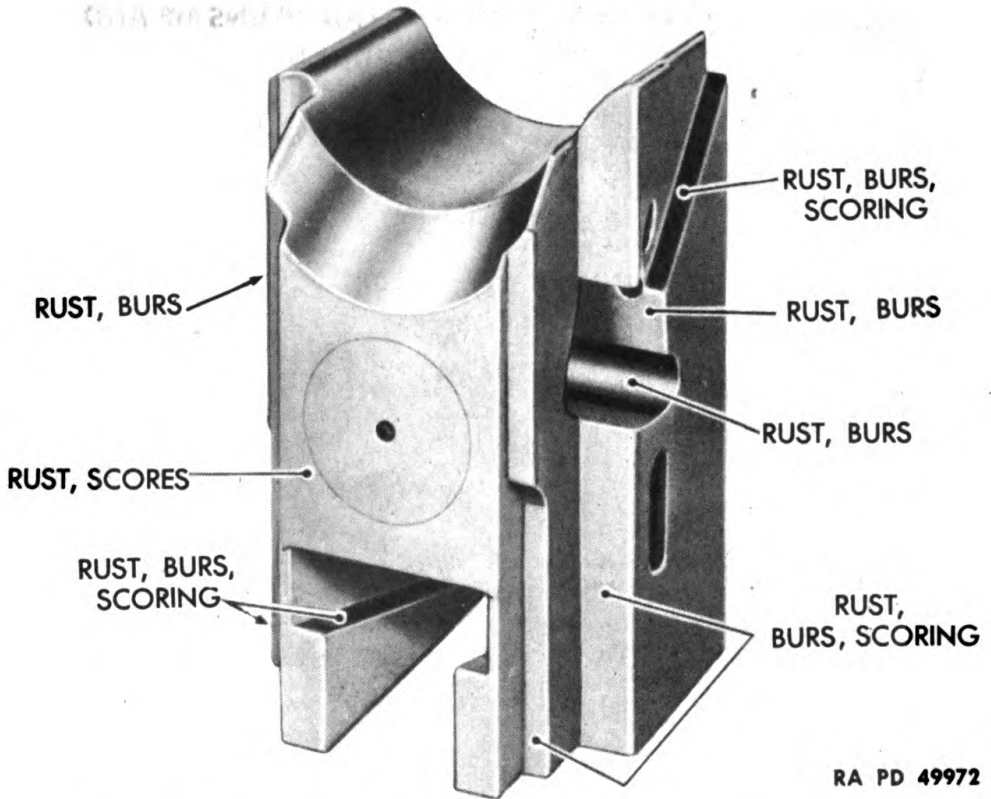
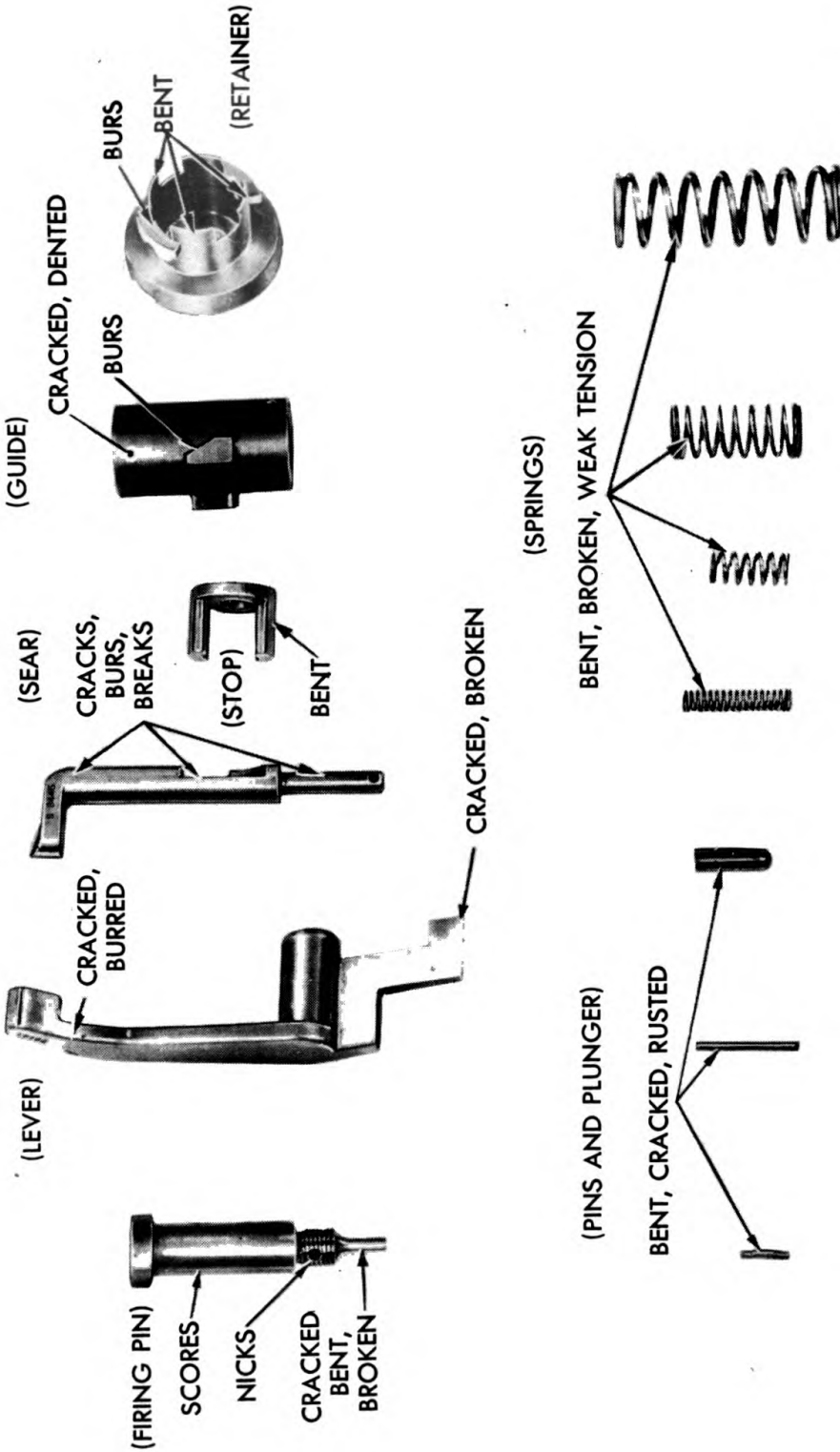


Figure 130 — Breechblock Showing Points to be Inspected and Possible Defects

Parts to be Inspected	Points to Observe
	Firing spring free of cracks, burs, and rust.
	Cocking lever plunger and cocking lever plunger spring in serviceable shape.
	Firing pin retracting spring not bent or broken; tension good.
	All pins free of cracks and rust.
Sleigh and recoil mechanism.	Rails and guides clean, smooth, and not burred or dented.
	Piston valve on recoil cylinder serviceable.
	Piston valve spring in good condition.
	Counterrecoil spring not broken or bent; tension good.
	All gaskets and parts in serviceable condition.

ORDNANCE MAINTENANCE — 37-MM ANTITANK GUNS M3 AND M3A1
AND CARRIAGES M4 AND M4A1



RA PD 81551

Figure 131 — Parts of the Breechblock Showing Points to Be Inspected and Possible Defects

INSPECTION INSTRUCTIONS

Parts to be Inspected	Points to Observe
Traversing mechanism.	<p>No rust, scratches, nicks, or burs on clutch.</p> <p>Worm free of burs and nicks.</p> <p>Pinion free of burs and nicks.</p> <p>Bearings not worn.</p> <p>Lower cover gasket in good condition.</p> <p>No cracks or broken teeth on traversing arc.</p> <p>Worm wheel in serviceable condition.</p> <p>Traversing mechanism spring not bent or broken; tension good.</p> <p>All covers, retainers, and screws in good condition.</p> <p>Traversing mechanism shaft not bent or burred.</p> <p>Controls bracket, controls bracket bushing, and flexible joint in good condition.</p> <p>Lever rod not bent or burred.</p> <p>Rod end yoke and traversing mechanism lever in serviceable shape.</p>
Elevating mechanism.	<p>All worms and gears free of nicks, burs, scratches, or broken teeth.</p> <p>Elevating screw free of nicks, scratches, burs, or broken threads.</p> <p>Gear case and elevating mechanism bracket in good general condition.</p> <p>All bearings in good condition and free of wear.</p> <p>Gaskets and retainer in good condition.</p> <p>All screws in good condition.</p> <p>Elevating screw thimble in satisfactory shape.</p> <p>Elevating mechanism locking spring in good condition.</p> <p>Long shaft gear not burred or nicked.</p>

**ORDNANCE MAINTENANCE — 37-MM ANTITANK GUNS M3 AND M3A1
AND CARRIAGES M4 AND M4A1**

Parts to be Inspected	Points to Observe
Wheels and tires.	<p>Disks and rims not bent.</p> <p>Bearings and retainer in good condition.</p> <p>Spindle not worn and threads not stripped.</p> <p>Axle not damaged.</p> <p>No excessive play in wheel bearings.</p> <p>No breaks on tires.</p>
Shield, apron, and guards.	<p>Condition of nuts and bolts good. (Roundness of bolt heads and threads.)</p> <p>Apron hinges, apron springs, and apron locking mechanism parts in good shape.</p> <p>Shield, apron, and guards not broken or cracked.</p>
Traveling lock.	<p>All parts in good condition.</p> <p>Traveling lock lever plunger spring not broken or bent.</p> <p>Traveling lock lever plunger not burred.</p>
Wheel segment latches.	<p>Wheel segment latch in working order and springs in good condition.</p>
Trails.	<p>Trail connection in good condition (hinge pins, bearings, and nuts).</p> <p>Locking pins in good condition.</p> <p>Lock and lock latch parts serviceable and spring tension good.</p> <p>Lunette latch in good condition.</p>
Axle and pintle support.	<p>Bearings not worn or damaged.</p> <p>Support swivel pin not burred.</p>

Section IV

MAINTENANCE AND REPAIR INSTRUCTIONS

	Paragraph
General	29
Tools	30
Breechblock	31
Breech ring	32
Tube	33
Sleigh	34
Recoil mechanism	35
Traversing mechanism	36
Elevating mechanism	37
Telescope mount	38
Apron, guards, and shield	39
Top carriage	40
Traveling lock	41
Trails	42
Axle and pintle support	43
Wheel segment	44
Wheels	45
Telescope M6	46
Subcaliber equipment	47
Care, cleaning, and lubrication	48

29. GENERAL.

a. In general, maintenance and repair of the materiel consist of the replacement of parts. However, some minor repairs, such as removing burs with a fine stone, removing rust and stains with CLOTH, crocus, or smoothing slightly rough surfaces, may be made. In certain cases, major repairs, such as welding broken trails or welding broken spades, may be performed. All parts should be thoroughly cleaned so that it will be easier to determine what repairs and replacements are to be made.

30. TOOLS.

a. Tools for maintenance and repair include those needed for disassembly and assembly of the gun and carriage (par. 6).

b. Other material needed for maintenance and repair includes CLOTH, abrasive, aluminum-oxide; CLOTH, crocus; COMPOUND, rust-preventive; SOLVENT, dry-cleaning, and a fine oil stone.

31. BREECHBLOCK.

a. Failure of the breechblock will cause the gun to fail to fire. If the breechblock is not functioning properly, if it is binding, is sluggish in movement, or fails to open or close fully, remove all burs, rust, or rough spots. For removing burs, use a fine oil stone. In case of serious damage, replace the breechblock.

**ORDNANCE MAINTENANCE — 37-MM ANTITANK GUNS M3 AND M3A1
AND CARRIAGES M4 AND M4A1**

b. Breechblock Firing Mechanism. Malfunctions of the firing mechanism may be due to a number of causes:

(1) If the firing pin cocking lever is binding, remove rust or burs. If it is badly damaged, replace it.

(2) If the firing pin cocking lever plunger binds, withdraw it, clean the air channel, remove rust or burs. If the cocking lever plunger fails to retain the firing pin cocking lever in the most forward position, replace the cocking lever plunger spring. Replace the spring, if it is bent.

(3) If the sear is not operating properly; that is, if it binds or fails to release the firing pin, remove all burs and rust. If it is bent or broken, it should be replaced. If the sear spring is weak, bent, or broken, it should be replaced.

(4) If the firing pin point is deformed, broken, rusted, scored, or pitted, replace it.

(5) Remove all burs and irregularities from the firing pin guide, firing spring stop, and firing spring retainer. Pay particular attention to the lug on the guide and the seats for the pin on the retainer. Remove all burs from the walls of the chamber in the breechblock in which the firing pin guide is seated and clean the chamber, being careful not to leave any foreign matter in the grooves.

(6) Replace the firing and retracting springs if they are broken, weak, or short of free length. The firing pin should never protrude beyond the breechblock face. If it does, replace the retracting spring.

32. BREECH RING.

a. Failure of the breech ring firing mechanism parts, or flaws in the ring itself, will lead to malfunctioning of the gun. The breech ring should be disassembled when not operating properly and the following repairs and replacements made of any defective part:

(1) **BREECH RING RECESS.** If the breechblock is not free in movement, or does not open or close fully, it may be due to roughness or burs in the breech ring recess. Burs, rust, and roughness should be removed.

(2) **OPERATING HANDLE DETENT.** If the detent does not seat properly, or if it is sprung so that it will not secure the operating handle in place, it should be replaced.

(3) **OPERATING CRANK.** If the operating crank tends to bind, or is not free in action, it is probably due to burs, or rough spots on the portions that ride in the slot in the bottom of the breechblock. All rough spots, burs, and rust should be removed. If the crank is excessively worn so that breechblock action is loose and sloppy, the crank

MAINTENANCE AND REPAIR INSTRUCTIONS

should be replaced. Also, if the splines are worn, broken, or badly gouged to the extent that operation is hindered or not positive, the crank should be replaced.

(4) **OPERATING HANDLE.** If the action of the operating handle is not positive or free in movement, the trouble may lie in defects of the splines. If the damage to the splines is excessive, or if the handle is cracked, bent, or broken, the handle should be replaced. If there are burs or rough spots, remove them with a fine oil stone.

(5) **OPERATING HANDLE LATCH.** If the latch hook does not engage firmly with the latch catch, it is probably due to a worn or broken condition. Replace the latch. If the operating handle latch spring is bent, broken, or weak, replace it.

(6) **EXTRACTORS.** If the gun fails to extract, the trouble lies in the extractors. If the extractors are broken, they should be replaced. Remove all burs and irregularities that would tend to interfere with extraction from the chamber. If the ejection is weak, remove any burs on the camming surfaces of the extractors and on the breech-block. If the extractors bind on the pivots, lift off the extractors and remove all burs and rough spots on the pivots and in the extractor hubs. Remove any burs from the round and flat surfaces on the lower ends of the extractors.

(7) **SEAR TRIPPER.** If the sear tripper does not trip the sear, it is probably due to excessive wear on the end contacting the sear or due to a burred condition. Remove burs, and replace, if broken or if the end does not contact the sear.

(8) **TRIGGER.** If the trigger does not move freely, it is probably due to burs. All burs, rough spots, and rust should be removed. If the trigger still does not function properly, it is probably due to wear or a broken condition. Replace the trigger in these cases.

(9) **TRIGGER PLUNGER AND COMPRESSION SPRING TRIGGER PLUNGER.** If the trigger plunger does not bear firmly against the trigger, it is probably due to a weak compression spring. The spring should be replaced. If the plunger binds in its hole, thus causing faulty trigger operation, burs or rough spots are probably the cause, and they should be removed.

33. TUBE.

a. If the tube is badly damaged, that is, with deep pits, deeply scored interior surfaces, large pits, torn lands, or excessive erosion at the origin of the rifling, it should be replaced.

b. If the gun is loose in the sleigh, it is probably due to looseness or damaged condition of the tube locking nut. If the locking nut is damaged, it should be replaced. Replace damaged tube locking nut disks and set screws.

**ORDNANCE MAINTENANCE — 37-MM ANTITANK GUNS M3 AND M3A1
AND CARRIAGES M4 AND M4A1**

34. SLEIGH.

a. If the action of the sleigh is sluggish or if it binds on the flange ways of the recoil cylinder, it may be due to damaged or bent sleigh flanges. If the flanges are bent, they may be straightened. Any burrs or rough spots should be removed.

35. RECOIL MECHANISM.

a. If there is leakage of oil from the recoil cylinder, it is due to loosened plugs or worn gaskets and packing. Tighten all threaded parts and plugs. If the leakage continues, remove the piston packing housing and replace the gaskets. In removing the gaskets, great care should be exercised to avoid damage to any of the parts of the piston packing housing. If the soft copper gasket at the end of the cylinder becomes hardened, it should be replaced. In an emergency, the hardened gasket may be softened sufficiently for reuse by heating to red heat and cooling in air or quenching. If the leather packing hardens, it should be replaced.

b. **Piston Rod.** If the piston rod and the piston are damaged beyond repair, that is, broken or badly worn, they should be replaced. The ring of antifriction metal on the rod may be dressed if wear is not excessive.

c. Slow and short recoil accompanied by excessive shock on the entire mechanism may be caused by too much oil in the recoil cylinder or faulty piston valve operation. If the amount of oil is responsible for the condition, reduce the amount of oil in the cylinder to create a void which will compensate for expansion of oil during firing (par. 48 e). If the gun fails to return completely to battery, this procedure is also applicable. If there is faulty piston valve operation, adjust the valve lift (par. 13 c (2)).

d. Fast and long recoil and excessive shock on the mechanism are usually caused by too little oil in the recoil cylinder or by too great a piston valve lift. If too little oil is the cause of fast and long recoil, the condition may be corrected by filling the cylinder with the proper amount of oil. If faulty valve action is the cause, reduce the valve lift by adjusting the valve nut.

36. TRAVERSING MECHANISM.

a. If there is backlash in the traversing mechanism, it is probably caused by insufficient tightness of the traversing mechanism caps. Tighten these, and then, if backlash is still evident in the operation, disassemble the mechanism and examine the bearings and gears. If any of these are damaged or worn, they should be replaced.

MAINTENANCE AND REPAIR INSTRUCTIONS

b. If the mechanism binds in operation, or is jerky in movement, it is probably due to burs and rough spots on gears and other parts. All burs and rough spots should be removed. Any broken parts should be replaced. All washers or gaskets, if hard or damaged, should be replaced. If any teeth on the traversing arc are chipped or broken, the arc should be replaced. All burs should be removed.

37. ELEVATING MECHANISM.

a. If there is backlash evident in the operation of the elevating mechanism, disassemble the mechanism and examine the gears and bearings. If these are worn or damaged, they should be replaced.

b. If the mechanism binds in operation, or is jerky in movement, it is probably due to burs and rough spots on gears and other parts. Burs and rough spots should be removed. Any broken parts should be replaced. Any washers or gaskets that are hardened or damaged should be replaced.

38. TELESCOPE MOUNT.

a. If the telescope mount is not in alinement with the telescope, it should be adjusted so that the line of sight is parallel with the axis of the gun bore and moves in unison with it. The mount may be corrected by adjusting the linkage. The method of testing and correcting the linkage adjustment is given in paragraph 28, FM 23-70.

b. If there are burs or rough spots on any of the telescope mount parts, they should be removed. If parts are damaged, they should be replaced.

39. APRON, GUARDS, AND SHIELD.

a. Apron.

(1) If the apron does not swing freely, it is probably due to bent hinge pins or burred condition of the pins. The pins should be straightened, or replaced if the bending is extreme. All burs should be removed.

(2) If the apron does not latch securely, it is probably due to weak or broken apron locking hook springs. These should be replaced. If the apron locking hooks are broken, they should be replaced. If the apron locking mechanism is bent, it may be straightened.

b. Guards. If the nuts and bolts that hold the guards in place are damaged, they should be replaced. If the guards are broken, they may be welded or replaced.

c. Shield. If the shield nuts and bolts are damaged, they should be replaced. If the shield is broken, it may be welded.

NOTE: Arc welding is generally used. A mild steel rod, $\frac{1}{8}$ inch or $\frac{5}{32}$ inch is used. A $\frac{1}{8}$ -inch rod is preferred.

**ORDNANCE MAINTENANCE — 37-MM ANTITANK GUNS M3 AND M3A1
AND CARRIAGES M4 AND M4A1**

40. TOP CARRIAGE.

a. If the trunnions bind in the trunnion bearings, the cause is probably rough spots and burs on the trunnions and bearings. These should be removed with a fine oil stone. Burs and rough spots should be removed from the trunnion caps.

b. All screws and nuts of the top carriage that are damaged or marred should be replaced.

c. In cases where the support arms and heavy exterior parts of the top carriage are damaged, they may be repaired by welding.

NOTE: Arc welding is generally used. A mild steel rod, $\frac{1}{8}$ inch or $\frac{5}{32}$ inch is used. A $\frac{1}{8}$ -inch rod is preferred.

41. TRAVELING LOCK.

a. If the traveling lock fails to swing freely, it is probably due to burred or bent traveling lock hinge pins. Burs should be removed and the pins straightened or replaced.

b. If the traveling lock fails to lock properly, the traveling lock lever plunger spring may be broken or weakened and should be replaced. Replace all worn or damaged parts. Remove all burs from the traveling lock lever plunger.

42. TRAILS.

a. If the spades are cracked or broken, they may be repaired by welding.

b. If the hollow section of the trail is broken, it may be repaired by welding. If it is bent, it may be heated to red heat and straightened.

c. If the lunette is broken it may be repaired by welding.

d. If the lunette does not lock properly, it may be due to burs on the lunette latch lock plunger or to a broken or worn lunette latch lock spring. The burs should be removed and the spring should be replaced.

e. If the trails fail to lock properly, it may be due to a broken or weakened trail lock lever spring. It should be replaced. If any of the other parts of the trail lock are damaged, they should be replaced. If the trail lock latch hook, or pins, or other parts are damaged, they should be replaced. All burs should be removed.

f. If the trail locking pins are bent or broken, they should be replaced.

g. All burs should be removed from the trail hinge pin. If the trail hinge pin and nut are damaged, they should be replaced.

NOTE: Arc welding is generally used on the trails. Mild steel rod $\frac{1}{8}$ inch or $\frac{5}{32}$ inch is used. A $\frac{1}{8}$ -inch rod is preferred.

MAINTENANCE AND REPAIR INSTRUCTIONS

43. AXLE AND PINTLE SUPPORT.

a. All bearings should be replaced if damaged. All screws should be replaced if the heads are chewed or if the threads are stripped. All bearing surfaces should have stains, rust, and burs removed. If the brackets on the pintle support (upper and lower) are damaged, they are usually replaced but under some conditions may be welded. The pintle support proper may also be welded to repair damage. If the axle is damaged, it should be replaced. All burs should be removed from the support swivel pin.

NOTE: Arc welding is generally used. A mild steel rod $\frac{1}{8}$ inch or $\frac{5}{32}$ inch is used. A $\frac{1}{8}$ -inch rod is preferred.

44. WHEEL SEGMENT.

a. The wheel segment is usually replaced if it is damaged. However, under some circumstances, it may be welded. Other parts, such as the axle collar and axle collar taper pin are replaced when damaged.

b. Parts of the segment latches are replaced if damaged. These include the segment locking plunger, segment locking plunger spring, and the segment locking plunger handle. All burs should be removed.

45. WHEELS.

a. Wheel bearings and oil retainer are replaced if they are damaged. If disks, wheel disk rings, or wheel disk beadlock rings are badly damaged they are replaced. If damage consists only of a bent condition, they may be straightened. If the heads of lugs are chewed or the threads stripped, the lugs are replaced.

46. TELESCOPE M6.

a. If the exterior optical surfaces of the telescope are dirty or oily, they should be cleaned. To remove dust from the optical surfaces, brush the glass lightly with a clean camel's-hair brush. To remove oil or grease from the optical surfaces, apply SOAP, liquid, lens cleaning, with a tuft of PAPER, lens, tissue; then wipe the surface gently with clean, dry lens paper. If SOAP, liquid, lens cleaning, is not available, breathe heavily on the glass and wipe it off as directed above. Do not wipe the lenses with the fingers or an oily cloth.

b. If the bearing surfaces which attach to the telescope mount are rough or burred, they should be smoothed with a fine stone.

c. Any other repairs to be made on the telescope are performed at an arsenal or manufacturer's plant.

47. SUBCALIBER EQUIPMENT (figs. 132 and 133).

a. The maintenance and repair of the cal. .22-.30 subcaliber equipment M6 consists, in general, of the replacement of parts. However, any burs, rough spots, and rust should be removed. Washers and gaskets that are hardened or damaged are replaced.

**ORDNANCE MAINTENANCE — 37-MM ANTITANK GUNS M3 AND M3A1
AND CARRIAGES M4 AND M4A1**

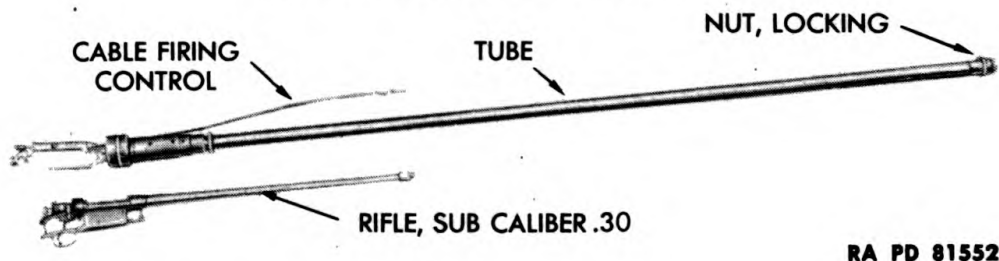


Figure 132 — Cal. .22-.30 Subcaliber Equipment M6

48. CARE, CLEANING, AND LUBRICATION.

a. **General.** Keeping all parts of the materiel in proper condition for immediate service is of vital importance. The correct use of proper lubricants, cleaning and preserving materials, and paints generally will keep the materiel in proper working condition. Extreme care must be exercised to insure that all moving parts are properly lubricated. Lubrication instructions must be strictly observed. Frequent inspections should be made to determine the adequacy of lubrication. Rust, dirt, grit, gummed oil, water, and other foreign substances, if allowed to accumulate, cause rapid deterioration of materiel.

b. **Gun.** Tubes become less copper fouled when properly cared for. The wear of the tube does not depend entirely upon the number

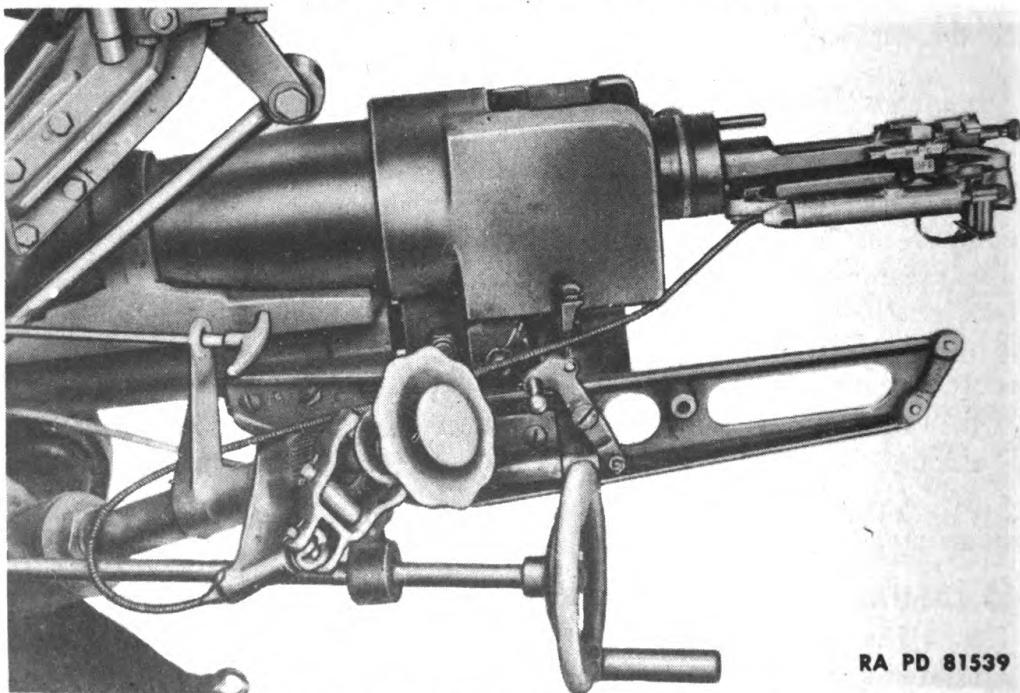


Figure 133 — Cal. .22-.30 Subcaliber Equipment M6, Assembled to Gun M3 and Carriage M4

MAINTENANCE AND REPAIR INSTRUCTIONS

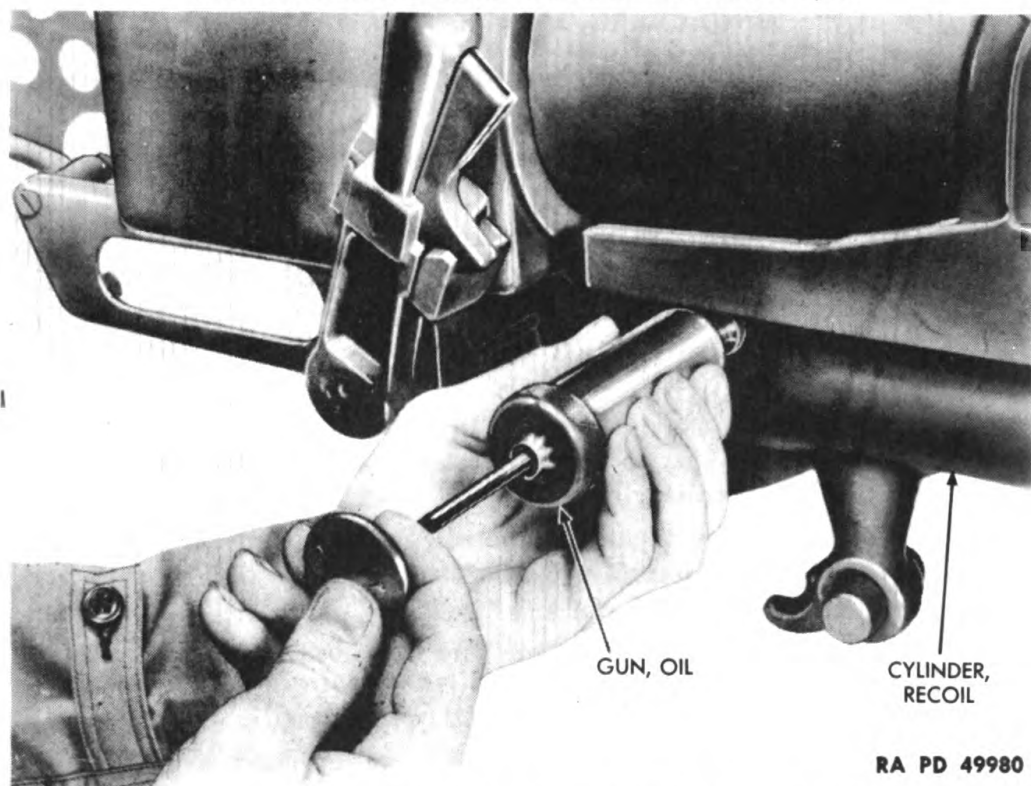


Figure 134 — Filling the Recoil Cylinder with Oil

of rounds fired, but also upon the care given the bore in cleaning and greasing. In cleaning, use a sponge and wash the bore with a solution of SODA ASH and water, or sal soda and water, in the proportion of $\frac{1}{2}$ pound of SODA ASH, or 1 pound of sal soda, to 1 gallon of water. The chamber and bore should then be rinsed thoroughly with clear water, wiped perfectly dry, and oiled with a light coat of OIL, engine (seasonal grade), as indicated on the lubrication guide.

c. **Breech Mechanism.** The breech mechanism should be disassembled and all parts of the firing mechanism thoroughly cleaned and, before reassembling, coated with a light film of OIL, engine (seasonal grade).

d. **Carriage.**

(1) Maintenance of the carriage requires proper cleaning, strict observance of lubrication procedures, and proper attention to the recoil mechanism, traveling lock, and trail lock.

(2) All bearing surfaces, screw threads, and exterior parts must be clean and free from dirt. Special attention should be given those bearing surfaces which are exposed. When assembling operations are being carried on, extra precautions must be taken to prevent the entrance of foreign matter into the working parts.

**ORDNANCE MAINTENANCE — 37-MM ANTITANK GUNS M3 AND M3A1
AND CARRIAGES M4 AND M4A1**

e. **To Fill Recoil Mechanism and Establish Void.** (For method of draining the cylinder, see paragraph 13 b (1)).

(1) Depress the cradle 1 degree or 2 degrees. Remove the recoil cylinder plug.

(2) Fill the oil gun with the prescribed oil (par. 48 g.) from a supply can, care being taken to have the nozzle of the oil gun well under the surface of the oil supply to avoid drawing air into the oil gun. After filling, point the nozzle upward and push the piston until oil starts to flow, in order to force out any air present in the oil gun.

(3) Remove the recoil cylinder plug and screw the oil gun into the plug hole (fig. 134). Then remove the recoil cylinder head plug at the front of the recoil cylinder.

(4) Force the oil by means of the oil gun into the cylinder until the oil flows out of the recoil cylinder head plug hole. The capacity of the recoil mechanism is 5 pints.

(5) Elevate the gun to 15 degrees and continue to force oil slowly through the recoil cylinder and out of the recoil cylinder head plug hole to eliminate all trapped air in the cylinder. When air bubbles cease to emerge with the oil, replace the recoil cylinder head plug.

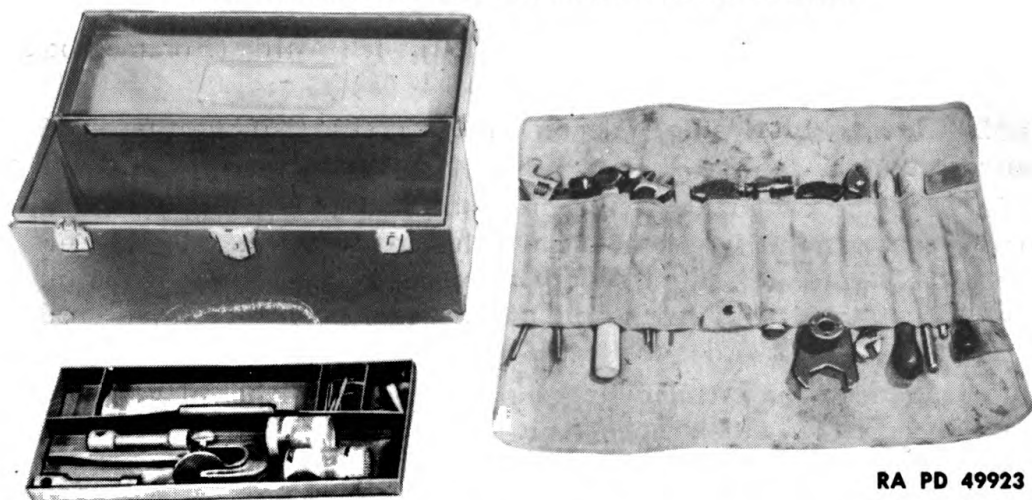
(6) Depress the gun to its original position of a 1- or 2-degree depression. Remove the oil gun and replace the recoil cylinder rear plug.

(7) Only low pour point OIL, recoil, heavy, will normally be used in the recoil mechanism (see par. 49 c (2) for recoil oil for use in cold climates). Water must not be introduced into the recoil mechanism. To insure the use of water-free oil, make the following tests: Fill a clean bottle with the oil. Any water will settle to the bottom. Invert the bottle, hold it to the light, and the water bubbles or drops will be seen sinking to the bottom. If the oil is cloudy, water may be present. Another test is to heat a shallow pan of oil to boiling. Any water will appear on the surface as minute bubbles. This test shows water not found by the settling test. If either of these tests show water, the oil on hand should be turned in.

(8) After filling the gun, it is sometimes necessary to drain off a small amount of oil from the recoil cylinder. This establishes a void which compensates for an expansion of the oil during firing. The requisite amount of oil to be removed may have to be established during firing. If draining is found necessary, elevate the muzzle slightly and unscrew the recoil cylinder plug sufficiently to permit about one tablespoonful of oil to flow out.

(9) Recoil oil should be kept in the original marked container until used. It should not be transferred to other cans or exposed to dirt or moisture. The greatest care must be exercised to prevent contamination of recoil oil.

MAINTENANCE AND REPAIR INSTRUCTIONS



RA PD 49923

Figure 135 — Tool Chest and Canvas Tool Kit

f. Tools. All tools should be kept free from rust, and in working condition at all times. When the tools are not in use, it is advisable to keep the tools covered with a light film of grease to prevent rust. Also the tools, when not in use, should be kept in their canvas tool kit and tool chest (fig. 135).

g. Lubrication. The materiel must be lubricated in accordance with the instructions given on the lubrication guide (fig. 136). On this guide are shown the points to be serviced. In addition, the type of lubricants required are specified, and the intervals at which they are to be applied are indicated. Supplementary instructions are given in the following notes. All note references in the guide itself refer to the subparagraph below having the same number.

(1) **FITTINGS.** Clean before applying lubricant. When bearings can be seen, lubricate until new lubricant is forced from the bearing.

CAUTION: Lubricate after washing gun and carriage. Do not use high-pressure washing system for cleaning artillery materiel.

(2) Intervals indicated are for normal service. For extreme conditions of speed, heat, water, sand, mud, snow, rough roads, dust, etc., lubricate more frequently.

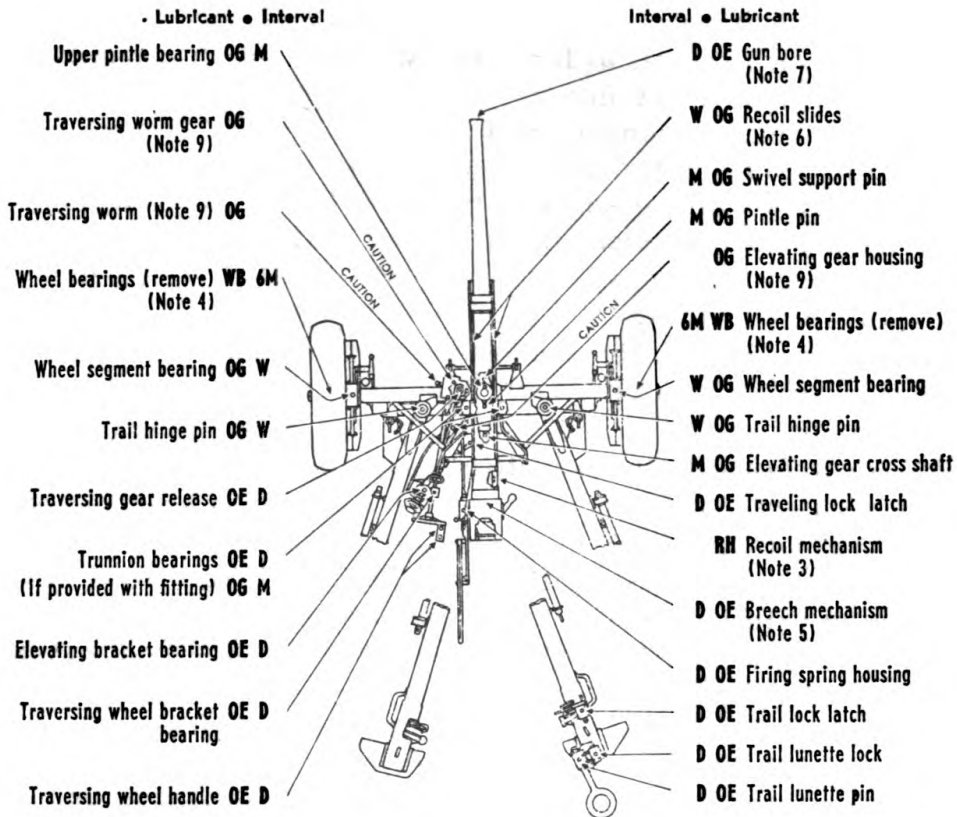
(3) **RECOIL FLUID.** For instructions on quantity and application of recoil fluid, refer to War Department Recoil Fluid Guide No. 19 and OFSB 6-6.

(4) **WHEEL BEARINGS.** Remove wheel, and clean and repack bearings. To clean and pack wheel bearings properly, they must be removed from the hub. Follow the procedure below:

(a) Remove the bearings from the hub and wash them in **SOLVENT**, dry-cleaning, until all old lubricant is removed from both inside and outside of cage.

(b) Lay them aside to dry and wash the inside of the hub and the spindle with **SOLVENT**, dry-cleaning.

ORDNANCE MAINTENANCE — 37-MM ANTITANK GUNS M3 AND M3A1
AND CARRIAGES M4 AND M4A1



KEY

RA PD 35611

LUBRICANTS	
OE—OIL, engine SAE 30 (above +32°) SAE 10 (below +32°)	WB—GREASE, general purpose No. 2
OG—GREASE, O.D. No. 0 (above +32°) No. 00 (below +32°)	RH—OIL, recoil, heavy

INTERVALS
D—DAILY
W—WEEKLY
M—MONTHLY
6M—6 MONTHS

Figure 136 — Lubrication Guide

(c) When bearings are thoroughly dry, pack the races with GREASE, general purpose, No. 2, and reassemble in hub. To pack a bearing satisfactorily, it is necessary to knead lubricant into space between the cage and the inner race. Do not apply any lubricant to the inside of the hub or on the spindle. The lubricant packed in the bearing races is sufficient to provide lubrication until the next service period. An excess may result in leakage of the lubricant into the brake drum.

(d) Mount the wheel on the spindle and tighten the nut on the end of the spindle until there is a slight drag when the wheel is rotated.

MAINTENANCE AND REPAIR INSTRUCTIONS

(e) Back off nut until the wheel turns freely without side play. Lock adjusting nut in position.

(f) Install hub cap. Lubricate bearings only.

(5) **BREECH AND FIRING MECHANISM.** Daily and before and after firing, clean and oil all moving parts and exposed metal surfaces with OIL, engine (seasonal grade).

CAUTION: To insure easy breech operation and to avoid mis-firing in cold weather, clean with SOLVENT, dry-cleaning; dry and lubricate with OIL, lubricating for aircraft instruments and machine guns. To clean firing mechanism, remove and operate pin in SOLVENT, dry-cleaning.

(6) **RECOIL SLIDES.** Remove locking key located below breech on right side, retract gun and apply GREASE, O. D., seasonal grade, to slides.

(7) **GUN BORE.** Daily and after firing, clean and coat with OIL, engine (seasonal grade).

(8) **OILCAN POINTS.** Daily, lubricate traversing mechanism universal joints, trail lock mechanism, clevises, hinges, and trigger mechanism with OIL, engine (seasonal grade).

(9) **POINTS TO BE SERVICED AND/OR LUBRICATED BY ORDNANCE MAINTENANCE PERSONNEL AT TIME OF ORDNANCE INSPECTION.** The following instructions pertaining to the traversing and elevating gear mechanism should be carefully observed: Every 6 months, clean housing and inclosed parts with SOLVENT, dry-cleaning, and coat gears with GREASE, O. D., No. 0, where temperatures above plus 32 degrees prevail, and GREASE, O. D., No. 00, where continued temperatures below plus 32 degrees are expected. This will necessitate total or partial disassembly. Where possible, apply new lubricant through cover plate. If lubricant is applied through fitting, do not fill housing above level of the level testing plug.

(10) **REPORTS AND RECORDS.** If lubrication instructions are closely followed, proper lubricants used, and satisfactory results are not obtained, a report will be made to the ordnance officer responsible for the maintenance of the materiel. A complete record of lubrication servicing will be kept for the materiel.

ORDNANCE MAINTENANCE — 37-MM ANTITANK GUNS M3 AND M3A1
AND CARRIAGES M4 AND M4A1

Section V

SPECIAL MAINTENANCE

	Paragraph
Preparing materiel for use in cold climates	49
Preparing materiel for use in hot dry climates	50
Preparing materiel for storage	51
Maintenance during storage	52
Cleaning materiel after storage	53

49. PREPARING MATERIEL FOR USE IN COLD CLIMATES.

a. Cold weather imposes certain limitations on the operation of the materiel. The normal lubricants provided will not allow operating mechanisms to function properly under low-temperature conditions; special precautions and cold-weather lubricants must be applied. All materiel to be winterized must first be thoroughly cleaned and dried. Cleaning is most efficiently done by washing with **SOLVENT**, dry-cleaning, employing brushes and scrapers where necessary. Care must be taken not to overlook cleaning small items that may appear insignificant in themselves. Field experience has proved that neglect in cleaning small linkages, bearings, and other similar moving parts may be the cause for malfunctioning of weapons in extremely cold climates. All moving parts must be free, and any tendency to bind must be corrected. Binding may become serious whenever dissimilar metals are used, such as a steel shaft running through a close-fitting bronze bushing. If clearances are reduced through dirt accumulation or shaft distortions, binding at low temperatures is likely to occur.

b. The proper cleaning of all moving parts and relubrication with cold-weather lubricants is essential for proper operation. All parts requiring **GREASE**, O.D., No. 0, at normal temperatures will be lubricated with **GREASE**, O.D., No. 00, which will not channel under the lowest temperature conditions which will be encountered. Moving parts normally lubricated with engine oil must be thoroughly cleaned and lubricated with **OIL**, lubricating, preservative, light. Under extremely low temperatures, operating parts may be operated dry during action, then cleaned and lubricated as above, when firing operations are over. **GREASE**, general purpose, No. 2, is used for lubrication of wheel bearings at all temperatures.

c. The following instructions are applicable, except where otherwise stated, when prevailing temperatures are consistently below zero degree F, or when sluggish operation at temperatures somewhat above zero degree F indicates their desirability.

SPECIAL MAINTENANCE

(1) BORE CLEANING SOLUTION.

(a) Cleaning of a cold gun tube after firing cannot be accomplished in normal manner at temperatures below 32 F because the water will freeze in the tube. If cleaning can be done with the tube hot, and hot water is available, normal soap, SODA ASH or sal soda solutions can be used. Otherwise, it will be necessary to add alcohol, glycerine, or ethylene glycol to the solution. To ten parts by volume of cleaning solution add the number of parts of one of the antifreezes shown below.

Temperature	Glycerine or Alcohol or Ethylene Glycol		
20 F	2 1/2	2	2
10 F	5	4	3 1/3
0 F	6 1/2	6 1/2	5
-15 F	10	9	7 1/4
-30 F	13	16	10
-40 F	16	27	12

(b) In an emergency, SOLVENT, dry-cleaning, gasoline or OIL, lubricating, preservative, light, may be used, but neither is as effective as the cleaning solution. In applying OIL, lubricating, preservative, light, to the bore after cleaning, care must be taken to work the oil in well so that it will reach all surfaces of the lands and grooves. When the gun is brought into a heated shop, condensation will occur on all metal surfaces. After the gun reaches shop temperature, the tube and all other bright parts must be wiped dry and recoated with oil to prevent rusting.

(2) OIL, recoil, heavy, normally used in the recoil mechanism, will be replaced by OIL, recoil, special, when the gun is operated in territories where the prevailing temperatures are below plus 15 F. To change the oil, drain the recoil cylinder (par. 13 h (1)). Then refill with the OIL, recoil, special, (par. 48 e). Upon completion of the change from OIL, recoil, heavy, to OIL, recoil, special, a notation to that effect should be entered in the gun book. All future additions of oil to the mechanism will be OIL, recoil, special, except in cases of emergency. Tests have shown the OIL, recoil, special, to be satisfactory in temperatures ranging from minus 35 F to plus 150 F. Where low temperatures make recoil operation with OIL, recoil, heavy, unsatisfactory, and the OIL, recoil, special, is not available, a temporary substitute can be obtained by bleeding out a quantity of the OIL, recoil, heavy, and replacing it with an equal volume of OIL, recoil, light. The proportion of OIL, recoil, heavy, to OIL, recoil, light, should be 4 1/4 pints to 3/4 pint (total capacity 5 pints). Exercising the recoil mechanism by retracting the recoiling parts is desirable after introducing the light oil.

**ORDNANCE MAINTENANCE — 37-MM ANTITANK GUNS M3 AND M3A1
AND CARRIAGES M4 AND M4A1**

(3) **GREASE-LUBRICATED BALL AND ROLLER BEARINGS.** It is impossible to replace warm weather grease in ball and roller bearings by forcing in the grease prescribed for low temperatures. Attempts to do this result in overloading of the bearings with unsuitable lubricant which will congeal at low temperatures and immobilize the moving parts. These bearings must be removed by disassembly from the materiel, washed thoroughly in **SOLVENT**, dry-cleaning, to remove all traces of heavy grease, dried, and then coated with the prescribed lubricant. The balls or roller, races, and cages should be thoroughly coated, but the bearing housings should not be packed full.

(4) **OIL-LUBRICATED BALL AND ROLLER BEARINGS.** Oil-lubricated ball and roller bearings should preferably be removed and cleaned. If this is impracticable, a thorough flushing with **SOLVENT**, dry-cleaning, followed by application of the prescribed oil will give generally satisfactory results.

(5) **PLAIN JOURNAL BEARINGS AND BUSHINGS.** It is preferable to disassemble these bearings, not only to remove thoroughly all heavy oil and grease, but also to smooth all roughness and to test for adequate clearances between shaft and bearing. Where disassembly is impracticable, heavy lubricant can usually be forced from the bearings by thorough flushing with the cold weather product.

(6) **GREASE-LUBRICATED GEARS.** Since it is practically impossible to wash heavy grease out of a gear case by flushing, grease-filled cases will be disassembled, the gears, case and bearings washed clean with **SOLVENT**, dry-cleaning, and all parts coated with **GREASE, O.D., No. 00**. In refilling the case, care must be taken to put in only enough grease for satisfactory lubrication. Overfilling will cause excessive drag.

(7) **RECOIL SLIDES.** Friction between recoil slides and guides absorbs an appreciable portion of the energy of recoil. Thickened or congealed lubricant on them increases this friction, shortens recoil, and retards counterrecoil. It is therefore vital to proper recoil and counterrecoil action that the slides be thoroughly cleaned of summer lubricant by disassembly, if practicable, surfaces stoned smooth and relubricated with **GREASE, O. D., No. 00**.

(8) **FIRING MECHANISM.** Not only must extreme cleanliness be maintained but also **OIL**, lubricating, preservative, light, must be applied sparingly. The best method of application, after cleaning thoroughly with **SOLVENT**, dry-cleaning, is to wipe the rubbing surfaces of the firing pin and attendant parts with a clean cloth which has been wet with the oil and wrung out.

50. PREPARING MATERIEL FOR USE IN HOT DRY CLIMATES.

a. When temperature conditions are high, **OIL**, engine, **SAE 30**, will provide proper lubrication. The recoil oil mechanism must be

SPECIAL MAINTENANCE

frequently checked to be sure that expansion of the oil does not result in an excess reserve with resultant damage to the recoil mechanism. The air pressure in the tires should be checked prior to operations and thereafter left alone unless there is a loss of pressure. Bleeding of air from the tire results in a rise in temperature and an increase in the flexing of the tire side walls, increasing the danger of tire failure.

b. Where conditions are such that sand and dust are apt to get into the operating mechanisms of the gun, such parts should be carefully cleaned and operated dry, since sand and dust in combination with oil or grease produce a cutting compound. At frequent intervals, any accumulation of sand or dust should be wiped off. At the conclusion of firing operations, the materiel should be cleaned, the indicated preservative applied, and the materiel covered,

c. Sand and dust must be kept out of the bore, since the presence of such foreign material when the gun is fired results in rapid erosion of the bore. An accumulation of dirt in the bore may cause expansion of the tube after only a few rounds have been fired. Close fitting muzzle and breech covers must be kept on at all times during travel and when not actually firing. If immediate or sudden action is expected, some protection can be secured by placing a piece of thin paper over the muzzle and fastening it in place with grease or twine. The gun may be fired with the paper in place since the column of air in front of the projectile will rupture or blow off the paper, and in any case the fuzes used will not operate to burst the projectile on contact with the paper.

d. Where temperature and humidity conditions are high, or where salt air is present, all parts must be thoroughly inspected at frequent intervals and the proper care and maintenance employed to guard against rusting and corrosion.

51. PREPARING MATERIEL FOR STORAGE.

a. Prior to storing the piece, the following precautions should be observed:

(1) Unpainted surfaces should be inspected for rust and other forms of corrosion which must be removed.

(2) In the cleaning of metal and in handling clean metal surfaces, gloves should be worn to protect the metal from acid stains and corrosion resulting from body perspiration. The preparation of metal surfaces for slushing in a heated room is excellent practice.

(3) COMPOUND, rust-preventive, heavy, should be applied to metal surfaces if the materiel is to be stored for a month or longer. It must be made fluid by heating prior to coating the metal. There are several methods of applying the compound to the metal, but the dipping of metal in the fluid compound is the most successful. In case dipping is not practicable, swabbing is the preferred method.

**ORDNANCE MAINTENANCE — 37-MM ANTITANK GUNS M3 AND M3A1
AND CARRIAGES M4 AND M4A1**

(4) Painted surfaces should be inspected prior to storage, and any damaged surface should be cleaned and repainted.

52. MAINTENANCE DURING STORAGE.

a. During the period when the materiel is in storage, it should be inspected periodically to see that the rust-preventive compound is staying in place and that rust spots are not developing either on the surfaces covered with compound or the painted surfaces.

b. It is recommended that when the materiel is stored for a considerable period, the recoil mechanism be exercised from time to time. The whole system can be exercised by moving the recoiling parts a short distance in recoil.

53. CLEANING MATERIEL AFTER STORAGE.

a. To remove the gun from storage, it is necessary to remove all the rust-preventive compound. The compound is soluble in SOLVENT, dry-cleaning, which can be applied with clean rags after the excessive part of the compound has been removed by scraping with wooden sticks.

Section VI

REFERENCES

	Paragraph
Standard nomenclature lists	54
Explanatory publications	55

54. STANDARD NOMENCLATURE LISTS.

a. Ammunition.

Ammunition, blank, for pack, light and medium field artillery SNL R-5

Ammunition, fixed and semifixed, all types, including subcaliber for pack, light and medium field artillery, including complete round data SNL R-1

Ammunition instruction material for pack, light and medium field artillery SNL R-6

b. Cleaning, Lubrication and Repair.

Cleaning, preserving and lubricating materials; recoil fluids, special oils, and miscellaneous related items SNL K-1

Soldering, brazing and welding material, gases and related items SNL K-2

c. Gun, 37-mm, M3 and M3A1; and carriage, gun, 37-mm, M4 and M4A1 (antitank) SNL A-44

d. Telescope M6 and telescope mount M19 SNL F-184

e. Tools.

Tools, maintenance, for repair of automatic guns, automatic gun antiaircraft materiel, automatic and semiautomatic cannon, and mortars SNL A-35

Truck, small arms repair, M1 SNL G-72

Truck, 2½-ton, 6x6, small arms repair, M7 and M7A1 SNL G-138

Current Standard Nomenclature Lists are as tabulated here. An up-to-date list of SNL's is maintained as the "Ordnance Publications for Supply Index," now published in OFSB 1-1

**ORDNANCE MAINTENANCE — 37-MM ANTITANK GUNS M3 AND M3A1
AND CARRIAGES M4 AND M4A1**

55. EXPLANATORY PUBLICATIONS.

- a. **Ammunition, general** **TM 9-1900**
- b. **Care and Preservation.**
 - Artillery lubrication, general** **OFSB 6-4**
 - Chemical decontamination materials and equip-
ment** **TM 3-220**
 - Cleaning, preserving, lubricating, and welding
materials and similar items issued by the
Ordnance Department** **TM 9-850**
 - Cold weather lubrication and service ofartil-
lery equipment** **OFSB 6-5**
 - Decontamination, 1941** **TC No. 38**
 - Defense against chemical attack** **FM 21-40**
 - General instructions for recoil fluid light and
medium in artillery (37-mm to 240-mm in-
clusive)** **OFSB 6-6**
 - Lubrication instructions: Gun, 37-mm, M3; car-
riage, gun, 37-mm, M4, M4A1 (AT)** **OFSB 6-A-44**
 - Military chemistry and chemical agents** **TM 3-215**
- c. **Inspection and Maintenance.**
 - Inspection of ordnance materiel** **TM 9-1100**
 - Maintenance and repair of pneumatic tires and
rubber treads** **TM 31-200**
 - Ordnance maintenance: Star gaging equipment,
impression outfits and pressure gages** **TM 9-1860**
 - Telescope M6 and telescope mount M19** **TM 9-1578**
- d. **Storage and Shipment.**
 - General supply: Storage and shipment of rub-
ber tires, tubes, and camelback** **OFSB 2-16**
 - Instructions and specifications for packaging
ordnance general supplies** **IOSSC -(a)**
 - Instructions for marking shipments of ordnance
supplies** **IOSSC -(b)**
 - Ordnance storage and shipment chart-Group A-
major items** **OSSC A**
- e. **37-mm gun, antitank, M3** **FM 23-70**

INDEX

A	Page No.		Page No.
Apron and apron locking mechanism		Breechblock	
assembly	54-55	assembly	23-25
disassembly	49-54	disassembly	21
inspection	107	inspection after disassembly	110-111
installation	55	installation	25-26
maintenance and repair	119	maintenance and repair	115-116
removal	49	removal	20-21
Assembly:		C	
axle and pintle support	103-104	Carriage, gun, 37-mm, M4 and	
breech ring	29	M4A1 (antitank)	
breechblock	23-25	assembly and instal-	
elevating mechanism	65-68	lation	59-61
firing mechanism controls	59-61	characteristics	4-6
recoil mechanism	45-48	maintenance and repair	123
shield, apron locking mechanism,		removal and disassembly	55-59
aprons, and guards	54-55	Cleaning materiel after storage	132
shoulder guard support, shoulder		Cold climates, preparation of mate-	
guard, and shoulder guard		riel for use in	128-130
guide	39	D	
sleigh	34-37	Data	12-13
telescope mount M19	37	Differences between models of guns	
tools	14-20	and carriages	6-11
trails	85-89	Disassembly	
traveling lock	97-99	axle and pintle support	99-103
traversing mechanism	81-84	breech ring	29
tube	34	breechblock	21
wheel segment and segment		elevating mechanism	64-65
latch	94-96	firing mechanism controls	55-59
wheels, hubs, and tires	91-94	recoil mechanism	42-45
Axle and pintle support		shield, apron locking mechanism,	
assembly	103-104	apron, and guards	49-54
disassembly	99-103	shoulder guard support, shoulder	
inspection after disassembly	114	guard, and shoulder	
maintenance and repair	121	guard guide	37-39
B		sleigh	34-37
Bore cleaning solution	129	telescope mount M19	37
Breech mechanism		tools	14-20
inspection	106	trails	84-85
lubrication	123, 127	traveling lock	97
Breech ring		traversing mechanism	70-75
assembly	29	tube	34
disassembly	29	wheel segment and segment	
inspection after disassembly	108-110	latch	94
installation	30-33	wheels, hubs, and tires	90-91
maintenance and repair	116-117		
removal	26-29		

ORDNANCE MAINTENANCE — 37-MM ANTITANK GUNS M3 AND M3A1
AND CARRIAGES M4 AND M4A1

INDEX

E	Page No.	I	Page No.
Elevating controls support		Inspection	
assembly 67-68		after disassembly 108-114	
disassembly 64		before disassembly 106-108	
installation 68		report of 105	
Elevating gear case		tools 106	
assembly 65		Intervals of lubrication..... 125	
disassembly 64-65			
installation 68			
Elevating mechanism		M	
assembly 65-68		Maintenance and repair	
differences between models		aprons, guards, and shield..... 119	
for M4 and M4A1 carriages 11		axle and pintle support..... 121	
disassembly 64-65		breech ring 116-117	
inspection 107		breechblock 115-116	
after disassembly 113		care, cleaning, and lubri- cation 122-127	
installation 68		during storage 132	
maintenance and repair..... 119		elevating mechanism 119	
removal 61-64		recoil mechanism 118	
Extractors, maintenance and re-		sleigh 118	
pair 117		subcaliber equipment 121	
		telescope mount 119	
F		telescope M6 121	
Firing mechanism		tools 115	
care in cold climates..... 130		top carriage 120	
inspection 106		trails 120	
lubrication 127		traveling lock 120	
Firing mechanism controls		traversing mechanism 118-119	
assembly and installation..... 59-61		tube 117	
differences between models		wheel segment 121	
for M4 and M4A1 carriages 11		wheels 121	
removal and disassembly..... 55-59		Mount, telescope, M19	
		inspection 108	
G		maintenance and repair..... 119	
Guards, and shield		removal and installation..... 37	
inspection 107			
maintenance and repair..... 119		O	
Gun, 37-mm, M3 and M3A1 (anti- tank)		Oilcan points 127	
characteristics 4-6		Operating crank, maintenance and repair 116-117	
cleaning and lubrication..... 122-123		Operation under unusual conditions	
		cleaning materiel received from storage 132	
H		cold climates 128-130	
Hot dry climates, preparation of materiel for use in..... 130-131		hot dry climates..... 130-131	

INDEX

O — Cont'd		Page No.		Page No.
Operation under unusual conditions—Cont'd			Trail lock	
maintenance during			assembly	89
storage		132	disassembly	85
preparation for storage.....		131-132	Trails	
R			assembly	85-89
Recoil mechanism			disassembly	84-85
assembly		45-48	installation	89
disassembly		42-45	maintenance and repair.....	120
inspection		106-107	removal	84
after disassembly.....		111	Traveling lock	
installation		48-49	assembly	97-99
maintenance and repair.....		118	disassembly	97
removal		39-42	installation	99
Reports and records of lubrication		127	maintenance and repair.....	120
S			removal	97
Shields, and guards			Traversing mechanism	
assembly		54-55	assembly	81-84
disassembly		49-54	differences between models	
installation		55	for M4 and M4A1 carriages..	11
removal		49	disassembly	70-80
Shoulder guard support, shoulder			inspection	107
guard, and shoulder			after disassembly	113
guard guide			maintenance and repair.....	118-119
assembly		39	Trigger plunger, maintenance and	
disassembly		37-39	repair	117
installation		39	Tube	
removal		37	assembly and disassembly.....	34
Sleigh			inspection	106
inspection		106-107	installation	34
after disassembly.....		111	maintenance and repair.....	117
installation		36	W	
maintenance and repair.....		118	Wheel bearing, lubrication.....	125-127
removal		34-36	Wheel segment and segment latch	
Subcaliber equipment, maintenance			assembly	94-96
and repair		121	disassembly	94
T			inspection	107
Tools			maintenance and repair.....	121
disassembly and assembly.....		14-20	Wheels, hubs, and tires	
inspection		106	assembly	91-94
maintenance and repair.....		115	disassembly	90-91
Top carriage, maintenance and re-			inspection	108
pair		120	installation	94
			maintenance and repair.....	121
			removal	89

TM 9-1245

**ORDNANCE MAINTENANCE — 37-MM ANTITANK GUNS M3 AND M3A1
AND CARRIAGES M4 AND M4A1**

[A.G. 062.11 (30 Jan 43)
O.Q. 461/324360 (25 Mar 43)]

BY ORDER OF THE CHIEF OF ORDNANCE:

G. C. MARSHALL,
Chief of Staff.

OFFICIAL:

J. A. ULIO,
Major, General,
The Adjutant General.

DISTRIBUTION: R 9(2); Bn 9(1); C 9(4)

(For explanation of symbols, see FM 21-6.)

